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ECONOMIC AFFAIRS

EKO: ECONOMICS AND ORGANIZATION  
OF INDUSTRIAL PRODUCTION

No. 6, June 1984

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USSR REPORT  
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## PROGRESS IN COUNTRY'S ECONOMY OUTLINED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 1-16

[Article by A. G. Aganbegyan, academician: "Important Positive Strides in the Country's Economic Life"]

[Text] Our time is a complicated, but fruitful period in the economic and social development of the Soviet Union, a period of in-depth analysis, wide-ranging research and large changes. A decisive condition for success on this path is the inviolable unity of the party and the people -- which is the inexhaustible source of our strength.

As we know, the November (1982) Plenum of the CPSU Central Committee, which was held under the leadership of the late outstanding activist of the party and state, Yuriy Vladimirovich Andropov, developed a complex of measures for overcoming the difficulties and unfavorable tendencies which appeared in the national economy between the 1970's and 1980's -- measures for giving our economy greater dynamism. During all of 1983 and the months of this year that have passed, under the leadership of the Communist Party, a great deal of hard, multifaceted work has been done to lay a basis for the important positive changes that have taken place in the country's life.

### Acceleration of Economic Development

First of all we managed to break the tendency toward retardation of the rates of economic growth. In 1983, industrial output increased by 4 percent as compared to 2.9 percent in 1982 and 3.0 percent in 1981. It is very important that this acceleration was achieved as the result of an additional increase in labor productivity. The rates of this increase amounted to 3.5 percent in 1983 as compared to 1.9 percent in 1982. So labor productivity played a greater role in increasing industrial production. This acceleration of the growth of industrial production took place primarily as a result of better work of the most important branches, which determine the development of the entire national economy. There was a significant acceleration of the growth of electric power engineering, nonferrous metallurgy, machine building and the chemical and petrochemical industry.

Important positive changes have taken place in the development of agricultural production as well. While during the first 2 years of the five-year plan the average annual increase in output amounted to 2 percent, in 1983 it was 5 percent. For the first time we surpassed the volume of agricultural output achieved in the best year until recently, 1978. One should especially emphasize the significant growth of animal husbandry, the most complicated branch of agriculture. Procurements of cattle and poultry increased in an amount unprecedented in past years -- from 10 to 11 million tons (in slaughtered weight), and milk -- from 58 to 63.4 million tons. This kind of growth of production was achieved as a result of increasing the productivity of the animals: in the public economy the average annual milk yield per cow increased by 7 percent, and the average daily weight gain of hogs on fattening -- 4 percent, and cattle -- 5 percent. Labor productivity in public agricultural production increased much more than it has in recent years -- 6 percent.

We have managed to achieve the positive changes that have taken place in industrial and agricultural production largely because of improvement in the work of all kinds of transportation. Cargo turnover increased by 4.8 percent in 1983 (in 1982 -- only 1.0 percent). We managed to overcome the long-lasting stabilization of the level of labor productivity in rail transportation and to increase it by 3.9 percent in 1983.

As we can see, successes in the economy were achieved mainly because of the increased effectiveness of production. Increasing the productivity of public labor in 1983 made it possible to obtain a saving of the labor of 3.5 million people. We saved approximately 2 billion rubles on raw materials, processed materials and other implements of labor. Thus the role of intensive factors in the development of the national economy was strengthened.

#### Reference Point -- Improvement of Well-Being

The increased effectiveness of public production has been a source of greater satisfaction of population needs. We managed, to a greater extent than in previous years, to turn the national economy in the direction of improving the well-being of the people. In 1983, the real per capita incomes increased by 2 percent as compared to 0.1 percent in 1982. The growth of real incomes took place mainly as a result of improvement of nutrition in the population. The sale of meat and meat products in state and cooperative trade increased during the year by 5 percent, animal fat -- 10 percent, cheese -- 9 percent, whole milk products -- 5 percent, vegetables -- 6 percent, and fruits and citrus fruits -- 18 percent.

In 1983 we constructed a larger number of well-designed apartments than in the past 5 years -- 2 million, with an overall area of more than 110 million square meters. For comparison let us recall that in 1981, 106.4 million square meters of dwelling space were introduced, and in 1982 -- 108 million square meters. As a result, in just 1 year housing conditions were improved for more than 10 million people. One must recall also that the startup of general educational schools, preschool institutions and hospitals was greater than it was in 1982.

The decrees of the CPSU Central Committee and the USSR Council of Ministers, "On Additional Measures for Improving the Supply of Consumer Goods for the Population in 1983-1985" and "On Further Development and Improvement of Consumer Services," were directed toward successful implementation of the social program of the 26th Party Congress. It is important to emphasize that there are no branches and should be no branches which have the right to stand aside from the tasks set by these directive documents. Saturating the market with consumer goods requires the participation of each branch of material production and each enterprise. This is precisely the way the problem is stated. And the base for producing these items is also being strengthened: preferential conditions are being established for extending credit to them, and additional limits are being established for raw materials and capital investments. It will be necessary to step up measures for economic liability of enterprises for the delivery of consumer goods that do not correspond to the established standard models, to develop stronger measures of incentive for the output of high-quality products, and to make sure that trade makes greater demands for the enterprises to fulfill delivery agreements.

#### A Responsible Year -- 1984

At the extraordinary February (1984) Plenum of the CPSU Central Committee in his speech, General Secretary of the CPSU Central Committee Konstantin Ustinovich Chernenko emphasized the continuity of the party policy and drew an important conclusion concerning the need to develop more actively the positive tendencies in the economy and to make them stable. The 1984 plan is directed toward this.

Above all, the 1984 plan is directed toward increasing the effectiveness of public production and maintaining the rates of economic growth. According to the plan, industrial output is to be increased by 3.8 percent, including 3.4 percent as a result of increased labor productivity. Moreover, our party has appealed to the labor collectives to search out reserves for a 1-percent above-plan increase in labor productivity and an additional 0.5-percent reduction of the production costs of industrial products. This appeal received a warm response in the associations and enterprises. Even during the first 2 months of 1984, the volume of industrial production increased by 5 percent and labor productivity increased by 4.7 percent as compared to the corresponding level of last year.

The most important and distinguishing feature of the 1984 plan is the essential turnaround of all branches of the national economy toward solving problems for further raising the standard of living of the Soviet people. Almost all of the increase in national income for 1984 is to be used for purposes of social development. According to the plan, there will be significant acceleration of the growth rates of those branches of production on which the well-being of the workers primarily depends. The plan includes higher growth rates of consumer goods in industry (group B) -- 4.0 percent, as compared to the increase in the production of means of production (group A) -- 3.7 percent. The increase in the production of goods for cultural and domestic purposes and household use is envisioned in the amount of 4.3 percent as compared to 3.0 percent in 1983. The growth rates in light industry will also increase a great deal -- 3.7 percent as compared to 0.9 percent. High

assignments have been established for increasing agricultural production -- 6.4 percent in 1984 (5.0 percent in 1983). All this serves as a basis for the planned doubling of the growth rates of commodity turnover: according to the plan, it will increase by 5.4 percent as compared to 2.7 percent in 1983 and the average annual calculation of 2.0 percent in 1981-1982. There will also be additional growth of the real per capita incomes, for which the planned increase is 3.5 percent as compared to 2.0 percent in 1983. The assignments for introducing housing are higher than the assignments for the five-year plan -- 109 million square meters.

Another manifestation of the concern of the Communist Party for the good of the people was the proposal made at the February (1984) Plenum of the CPSU Central Committee to use all the funds and resources that will be received as a result of the above-plan increase in labor productivity and the additional reduction of production cost for improving the working and living conditions of the Soviet people, medical service and housing construction.

The successful development of the country's national economy in 1984 and the fulfillment of the 11th Five-Year Plan as a whole will create conditions for achievement of even higher goals in the future. This is even more important since at the present time, development of the 12th Five-Year Plan and the long-range prospects for the period up to the year 2000 is in full swing.

The new five-year plan is developing in keeping with the party's economic strategy, which consists primarily in changing the national economy over to the path of intensive development and thus providing for improved well-being and all-around development of the members of the Soviet society. "The new five-year plan," Comrade K. U. Chernenko stated at the February (1984) Plenum of the CPSU Central Committee, "should become primarily a basis for deep qualitative changes in production; it should make a decisive breakthrough in the matter of intensification of all branches of our national economy."

#### Figures Necessary for Understanding the Situation

The current period in the country's economic development is a turning point, in which the conditions of management are changing rapidly. The essence of these major changes consists in a sharp reduction of the possibilities of our development through extensive factors, through enlisting additional resources into production. Therefore the task consists in compensating for the reduction of the growth of resources with a greater increase in the effectiveness of public production, while ensuring stable rates of the country's economic and social development. Let us look from this vantage point at the tendencies in our economic development, beginning with the 1970's (see table 1).

As we can see, the rates of growth of the productive resources have dropped significantly. It is known that as a result of the demographic consequences of the Great Patriotic War, under the 11th Five-Year Plan the overall growth of the number of able-bodied population dropped to one-third - one-fourth of what it was, which leads to a reduction of the increase in the number of workers. This requires acceleration of the growth rates of labor productivity and an increase in its role in public production. An even more significant

reduction of the growth of labor resources is expected under the 12th Five-Year Plan. Apparently, for the first time in our history we shall have to provide for the entire increase in production by increasing labor productivity.

Table 1. Development of the USSR National Economy under the 9th, 10th and 11th Five-Year Plans. Growth During 5 Years, in Percent.

Indicators	9th Five-Year	10th Five-Year	11th Five-Year
	Plan 1971-1975	Plan 1976-1980	Plan 1981-1985 (expected fulfillment)*
<b>Final Indicators</b>			
Produced national income	32	24	17
National income used for consumption and accumulation	28	21	17
Real per-capita income	24	18	13
<b>Production Resources</b>			
Fixed production capital	52	43	30
Production capital investments	44	23	17
Products of the extraction industry	26	10	5
Number of people employed in material production	6	6	3
<b>Effectiveness of production**</b>			
Output-capital ratio	-13	-11	-10
Effectiveness of capital investments	-8	1	0
Effectiveness of utilization of industrial raw material	5	13	12
Productivity of public labor	25	17	14

\* Calculated on the basis of continuation of average annual rates of economic development in 1981-1983, taking 1984 plan into account.

\*\* Calculated according to indicator of produced national income.

At the same time, the growth of production capital investments and fixed production capital is being reduced by half. This is associated with a reduction of the share of the accumulation fund -- the main source of capital investments -- in the national income, as a result of the increased proportion of the consumption fund. Let us recall that the proportion of the consumption fund increased from 71 percent in 1970 to 75 percent in 1980, and it is to increase to 78 percent, according to the plan for 1985; the proportion of the accumulation fund is to decrease correspondingly from 29 percent to 22 percent. This redistribution within the framework of the national income was related to the need to search out additional resources for improving the well-being of the people, the main source of which is the consumption fund. Under the conditions that have arisen, it is necessary to increase the effectiveness of production capital investments and to improve the dynamics of the output-capital ratio: only this will make it possible, with a reduction of production resources, to maintain the necessary growth rates of the national income.

The reduction in the growth of fuel and raw material extraction will be even greater, to approximately one-fifth. Mining and geological conditions have deteriorated in the extraction industry as a whole, and there is an increasingly greater need to shift the main fuel and raw material bases to the uninhabited eastern and northern regions. Both of these will lead to making fuel and raw material appreciably more expensive. Calculations show that it is becoming more advantageous to invest funds for a general savings on raw material than it is to organize additional extraction of them. In this connection the output of final product per unit of expended fuel and raw material and more economical utilization of them become especially important.

#### Figures Confirming the Correctness of the Chosen Path

As we can see, it is necessary to carry out a major restructuring in all areas and to change over from extensive to intensive development. And we have achieved a certain amount of success along this path. If one compares the past three five-year plans it is clear that under the 9th Five-Year Plan the effectiveness of production increased mainly as a result of increasing the productivity of public labor. But the effect here was achieved largely by reducing the output-capital ratio and increasing the effectiveness of capital investments. And in addition, the material-intensiveness of production decreased insignificantly.

Under the 10th Five-Year Plan we managed to achieve better utilization of industrial raw material and to reduce the material-intensiveness of public production much more. At the same time the indicator of the effectiveness of capital investments was stabilized. It is true that we did not manage to maintain the growth rates of the productivity of public labor that had been achieved in the past; they dropped somewhat.

Under the 11th Five-Year Plan, in addition to the aforementioned factors of increasing effectiveness, there was some improvement of the dynamics of the output-capital ratio. Fuel and raw material are being utilized economically and the effectiveness of capital investments has stabilized.

Let us try now to represent in general form the existing tendencies in development. In doing this let us recall that all kinds of production resources are based on labor: fixed capital was produced at one time, labor was expended on the extraction of fuel and raw material and on the production of equipment and construction and installation work, from which capital investments are formed; workers of all spheres of material production manifest themselves also in labor. And since any production resources are based on a single substance -- labor, these various kinds of resources can also be reduced to a unified measure, specifically through the indicators of the norms of effectiveness in the utilization of these resources (see Table 2).

Table 2. Indicators of the Effectiveness of the USSR National Economy Under the 9th, 10th and 11th Five-Year Plans. Growth During 5 Years, %

Indicators	9th Five-Year	10th Five-Year	11th Five-Year
	Plan 1971-1975	Plan 1976-1980	Plan 1981-1985 (expected fulfillment)
National income used for consumption and accumulation	28	21	17
Production resources	21	13	9
Effectiveness of production	6	7	7
Share of factors extensive	3/4	2/3	60 Percent
intensive	1/4	1/3	40 Percent

As we can see, during the years of the 10th and 11th Five-Year Plans, we managed to achieve a certain acceleration in the changeover to more complete utilization of intensive factors in the growth of public production. But this could not compensate for the more significant reduction of the growth of productive resources, as a result of which the rates of economic development dropped somewhat, especially under the 10th Five-Year Plan. The development of the national economy under the 11th Five-Year Plan is creating the possibility of overcoming this tendency.

#### Much Is Left to Do

Under the 12th Five-Year Plan, we must carry out a decisive changeover of the national economy to mainly an intensive path of development. The proportion of intensive factors should become predominant and reach, say, two-thirds. This is the more necessary since under the 12th Five-Year Plan we are expecting a further drop in the growth rate of production resources, especially of the number of people employed in material production and of production capital investments. In forthcoming years we shall have to achieve a further increase in labor productivity, make the tendency toward increasing

the effectiveness of capital investments more stable, improve the dynamics of the output-capital ratio, and proceed in the direction for more effective utilization of fuel and raw material.

All this will make it possible to take another large step along the path of raising the standard of living of the Soviet people. This is precisely the orientation of the Food Program, which is intended for the period up to 1990, and also the state programs which are currently being developed for improving the production of consumer goods and developing the sphere of services.

Much will have to be done for further improvement of housing conditions. We must proceed boldly toward expanding the cooperative bases and individual construction. It is intended basically to satisfy the needs of the population for day nurseries and kindergartens in the next few years. In carrying out the school reform, investments in school construction will be increased and wages will be increased for teachers and other workers in public education. And in the future there will continue to be concern for veterans of war and labor, families with many children, young couples, and in general for improvement of living conditions for Soviet people.

Here the question is not only about fuller satisfaction of material needs, but also about simultaneous development of the individual of the new world and his ideological and moral growth. It was precisely toward this, as we know, that the decisions of the April (1984) Plenum of the CPSU Central Committee were directed, as were decisions from the recent sessions of USSR Supreme Soviet, which adopted the main directions for the school reform.

#### **A Time of Experiments and Research**

In order to implement the party's plans for the country's further economic and social development, it is necessary to take advantage of all reserves and possibilities, and they are considerable. The key to mobilization of these possibilities is the utilization of the advantages of our socialist system. As was noted at the extraordinary (1984) Plenum of the CPSU Central Committee, it is necessary "to exhibit greater independence at all levels, to search boldly, and, if necessary, to take justified risk on behalf of increasing the effectiveness of the economy and improving the well-being of the people."

It is necessary first of all to put social, organizational and economic reserves to work. The experience of 1983 and the beginning of 1984 clearly showed how great are the possibilities of further increasing the effectiveness of production as the result of increasing the labor and social activity of the workers. The measures that have been taken for strengthening organization, discipline and order, for mobilizing the initiative of the masses and for raising their awareness immediately produced a significant result. The first to increase were qualitative indicators, and labor productivity began to increase more rapidly in many units.

Still, this improvement of economic indicators was taking place as a result of reserves which were, as it were, on the surface. And in order to proceed further, to deeper qualitative changes in the national economy, it will be necessary to include two more factors in advancing the economy: first, to

improve the management of the economy and restructure the economic mechanism and, second, to achieve a considerable acceleration of scientific and technical progress.

A large amount of work is being done in the first of these two directions. In the country there is a constant search for new economic forms, and a new economic mechanism is being introduced in agricultural production on the basis of agro-industrial associations. In five branches of industry -- the USSR ministries of the electrical equipment industry and heavy machine building, the Belorussian light industry, the food industry of the Ukraine and local industry in Lithuania -- they are conducting a large-scale experiment in expanding the rights of the associations and enterprises and increasing their responsibility for the final results of their labor. The first results show an improvement of the basic indicators of operation at enterprises that are operating under the conditions of the experiment. Above all, a significant change has been noted in the degree of fulfillment of economic agreements.

At the same time, the movement for collective forms of work has been expanding and deepening. The most effective areas are becoming more and more widespread: the changeover of brigades to cost accounting [khozraschet], the introduction of the contract system, the changeover to comprehensive and consolidated brigades, and the introduction of the collective contract for the entire section, shop, production or even individual enterprises and organizations, with the inclusion of management and engineering and technical personnel in this form. In particular, on the initiative of Novosibirsk organizations, the State Committee for Labor and Social Problems and the AUCCTU, an experiment is being conducted at 15 enterprises and organizations of Novosibirsk for changing large subdivisions over to the collective contract, with the enlistment of engineering and technical personnel in it. An important experiment related to increasing the effectiveness of the work of design and engineering personnel is being conducted in organizations of Leningrad. In construction too they are searching for a better economic mechanism, one which is directed toward reducing time periods, improving quality and making construction less expensive, and a way is being made for the movement toward "turnkey" construction.

It will be necessary to generalize these experiments and, in keeping with the instructions of the December (1983) Plenum of the CPSU Central Committee, to prepare a comprehensive program for improving the system of management of the entire economic mechanism and bringing it in line with the urgent tasks related to the development of public production.

Here, special attention should be devoted to the creation of the necessary economic, organizational and moral conditions and prerequisites for the acceleration of scientific and technical progress. The decree of the CPSU Central Committee and the USSR Council of Ministers, adopted last year, "On Measures for Accelerating Scientific and Technical Progress in the National Economy," was directed toward this. It is scientific and technical progress that is the main factor in intensification of public production throughout the entire long-range future. It will be necessary to develop and extensively introduce new technological systems that are based on new generations of technical equipment, and to do this, as party and government leaders

emphasized at the February 1984 meetings with the electorate, it is necessary to strengthen the material and technical base of the national economy, to restructure machine building, and to utilize electronic equipment on a larger scale. On the basis of this it will be necessary to provide for rapid and continuous renewal of the production apparatus of all branches of the national economy. This will make it possible to sharply reduce the proportion of heavy physical and unskilled labor and to change over to comprehensive mechanization and extensive automation of production.

#### Serious Conclusions Needed for the Development of Economic Science

The large and complicated tasks in the progressive development of the national economy at the stage of a developed socialist society places greater requirements on economic science. Evidence of the concern of the CPSU Central Committee for further development of economic science is the program decree concerning the activity of the Institute of Economics of the USSR Academy of Sciences. The questions that were raised have been considered profoundly and comprehensively by the Division of Economics of the USSR Academy of Sciences and in economics institutes. Serious conclusions should be drawn from the decree by economics journals as well, including our EKO. These questions will be considered in a special article in the next issue.

We shall conclude our article with a reminder of Comrade K. U. Chernenko: "It is necessary to decisively overcome all conservatism and lethargy. In a word, in the sphere of economics the slogan should be: from correct thought armed with experience -- to bold actions!"

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## PRODUCTS FOR USE IN MACHINE BUILDING DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 17-24

[Article by O. V. Spasskaya -- on the state committee for machine building under the USSR Gosplan, she was in charge of the administration for the development of interbranch productions (1963-1965), and in the Ministry of the Machine Tool and Tool Building Industry -- the administration for coordination of production of products for general machine building use (interbranch productions) from the time it was created (1965) until 1983 -- (Moscow): "An Independent Branch -- Industry for Products for Use in General Machine Building"; passages enclosed in slantlines printed in boldface]

[Text] Machine building manufactures and consumes large volumes of parts and components that all have the same design, service purpose, and operational requirements, and also blanks which have a great deal in common technologically. The proportion of these products is quite significant: they comprise more than 20 percent of the entire production volume in machine building. Therefore it is becoming an essential organizational and economic problem to raise the level of production concentration of products for general machine building use (OMP) and, on the basis of this, to provide for deeper specialization.

But because of conditions which have arisen historically in the development of machine building on the basis of comprehensive plants, the production of these products even today is to a significant degree spread out among a multitude of enterprises which in many cases are not of optimal sizes (capacities) and have various technical levels.

Thus according to data from a one-time investigation conducted by the USSR Central Statistical Administration, by the beginning of the 10th Five-Year Plan (the situation remained approximately the same throughout the entire course of it), 217 enterprises of 22 departments produced various volumes and various kinds of hydraulic, pneumatic and lubricating equipment and supplies. More than 170 of them were in machine building. Yet more than half of the products came from 36 specialized plants in the system of six ministries. Of these plants, 25 belong to interbranch industries that are under the jurisdiction of the Ministry of the Machine Tool and Tool Building Industry. The rest of the items were produced by 40 specialized shops and 140 sections

at comprehensive machine building plants. The average capacity of one of these industries is one-tenth the optimal.

Machine building annually consumes 20-30 million pulleys of various kinds and up to 40 million bushings, flanges and so forth. The majority of these are standardized. But almost every plant manufactures them in volumes just sufficient for its own needs. More than 1,000 shops and sections produce their own fastening items since specialized enterprises are still not able to satisfy the demand for them.

Or take gear wheels -- the most widespread parts in machine building, which have complicated technology and require costly precision instruments for their manufacture. According to calculations of our institute, 600 million of these are produced each year. But even this production is spread out. These are produced in almost every other plant. The zone of optimal capacities for specialized productions is 6-12 million gear wheels produced each year (depending on the designs, purposes, parameters and so forth). But many plants produce 1,000 of them or less.

Special mention should be made of centralized casting, forging and welding. They satisfy quite an insufficient proportion of the demand for this kind of work. The restructuring of the procurement base for machine building is proceeding extremely slowly. Even today it includes a considerable number of small and inefficient industries. By the beginning of the 11th Five-Year Plan more than 45 percent of the shops for iron casting, about 50 of those for steel, and about 65 percent of those for forged billets had capacities of up to 3,000-5,000, and their share in the overall production volume amounted to 10-12 percent. Almost every machine building enterprise has the one of these kinds of billet shops.

Naturally, the dispersion of the production of OMP products not only does not stimulate the use of highly productive technical equipment, but even makes it impossible to introduce such equipment as automated lines and automated machine tools. This increases the demand for labor resources. About 2 million people are employed in the manufacture of OMP products, and 75 percent of them are in machine building.

Great reserves lie in concentrating the production of products of the same kind and, on the basis of this, specialization. The path toward their efficient utilization is the creation of large-scale highly specialized capacities for centralized manufacture of OMP products.

It is to the point to recall that in 1960-1963, under the conditions of territorial management of industry, large specialized enterprises began to take form for centralized production of products for general machinebuilding applications.

During this same period in the USSR Gosplan and the gosplans of a number of union republics independent subdivisions were developing, which were in charge of questions of specialization in the production of OMP products. They are operating actively and with initiative in the Russian Federation, the Ukrainian, Belorussian and Lithuanian SSR's and elsewhere.

In order to carry out a unified technical policy, the USSR State Committee for Machine Building under the USSR Gosplan in 1963 formed an administration for the development of interbranch productions. The close business contact and interaction of the aforementioned unity, supported by the community of tasks and the joint performance of a number of jobs, made it possible to determine the main milestones in the development of specialized industries for producing OMP products. All that was left was to make a decision at the government level. And it was made during the changeover to the branch structure of management under the 8th Five-Year Plan. A new specialized branch began to form in machine building -- the industry of interbranch productions (this is how it was designated in the list of branches of the USSR Gosplan that was adopted when developing national economic plans).

**How Does the Formation of a Branch Proceed?  
What is Used as a Basis for its Specialization?**

Taking into account the primary needs of machine building, the profile of the products of interbranch industries was determined as follows: parts, components and blanks as an indispensable part of the designs of machines. As a base, they use the extensive applicability of the products in machines and mechanisms with various purposes, the common nature of the designs and service purpose, the possibility of immediate utilization (installation) without additional work or completion of sets, and also the identity of the technology of manufacture and the possibility of organizing large-series production.

OMP products include pneumatic and hydraulic drives and pneumatic and hydraulic fittings; lubrication equipment (including lubricants with the majority of automated systems) and filtering devices; reduction gears for industrial purposes; fastening items with increased precision; cast iron, steel and nonferrous metals; molding sand, auxiliary molding materials (paints, putties, clay, cord and so forth) as an indispensable part of casting production; stamped pieces (hot); pieces forged from ingots; welded metal structures for machine building purposes; and items for metal powders.

In 1965, the organization of interbranch productions was entrusted to the Ministry of the Machine Tool and Tool Building Industry. The formation of an independent ministry for OMP products turned out to be unrealistic during this period (although the volume of products would have fully justified such a step) since the material base was extremely weak, and specialized enterprises were not very numerous and were small. Therefore it was quite logical to concentrate these productions in machine tool building, since its very nature as a general machine building branch, the purpose of its products and its production ties could become a basis which would make it possible to utilize the experience that had been accumulated more efficiently and to reduce the period of "search" in the organization of the new branch. They also had in mind the fact that machine tool builders had long ago entered on the path of creating centralized enterprises for producing cast billets, hydraulic equipment, machine tool standards, and so forth.

The task was to organize, bring to a certain degree of maturity and introduce into "independent life" with its own management staff, the ministry, an industry of interbranch productions. This required the corresponding

organizational conditions. Therefore in the structure of the central staff of the Ministry of the Machine Tool and Tool Building Industry a unit was created for the formation of the branch -- four production subdivisions, which are now the All-Union Industrial Associations Soyuzgidravlika, Soyuzmashnormal', Soyuzlitprom and Soyuzformomaterialy, and also a specialized functional administration -- the administration for coordination of the production of OMP products. The following functions are concentrated in the latter: technical development, production planning and capital construction. It is in charge of coordinating the prospects of the industry of interbranch productions with the machine building complex as a whole.

The system of planning the development of interbranch specialized productions as an independent area in machine building is being perfected. Since 1966 it has been included on a separate line in the national economic plan. Subsequently, independent control figures for development were established as were capital investments for the current and long-range periods. A code for the industry of interbranch productions was introduced into the system of state accounting. In the consolidated division of machine building and metal processing of the USSR Gosplan they are creating independent subdivisions which handle interbranch productions and OMP products.

The decisions of the 24th, 25th and 26th party congresses devote a great deal of attention to the deepening of specialization and accelerated development of specialized capacities for producing products for general machine building use, improving the procurement base, and also developing centralized manufacture of OMP items more rapidly.

All these prerequisites have determined the further activity for forming the industry of interbranch productions.

Initially, 47 existing enterprises were transferred to the branch for OMP products. The majority of these were small plants with a low culture of production and extremely limited product lists, with mainly outdated designs. And 18 of them were mines for producing molding materials. Also transferred to this branch were 25 plants which were either in the initial stage of construction or in the stage of preplanning work. At that time, the fixed industrial production capital amounted to 100 million rubles, there were 26,000 workers, and the volume of products produced was 125 million rubles.

/As you can see, the "initial fund" of the branch could in no way satisfy the needs of machine building./ Its development could proceed only along the path of creating new capacities -- highly specialized enterprises of optimal sizes, which would make it possible to utilize most efficiently the special equipment, automated lines and principally new technological processes.

/At present, 30 large specialized enterprises have been constructed and put into operation in the branch, and 40 of them have either been expanded or renovated. The number of plants in operation has almost doubled./ Fixed capital has passed the 1 billion mark. About 2.5 million square meters of production space have been constructed. According to the 11th Five-Year Plan, fixed industrial production capital is to be increased by more than 60 percent as compared to 1980.

The structure of the branch includes production and scientific production associations and large independent enterprises. The volume of commercial output is increasing regularly. The average growth rate during the period of the 8th-10th Five-Year Plans amounted to 187 percent. The structure of the output has also been formed: completed items comprise 60 percent, and all kinds of blanks plus molding materials are within the range of 40 percent.

In order for the branch to live a full life, there will be further development of scientific research, design-technological and planning organizations. Head institutes are included in them: VNIIIGidroprivod, VNIIIReduktor and GiproNII Mash. Head special design bureaus have been organized for the various kinds of products. But the period of establishment is far from complete in a number of organizations.

#### Hydraulic and Pneumatic Equipment -- A Necessary Condition for Progress in Machine Building

During the past 15 years, because of the increased output of hydropneumatic machines and equipment, there has been a sharp increase in the demand for systems of hydraulic drives, hydraulic pumps, pneumatic drives and hydropneumatic equipment to go with them. This is why new enterprises that specialize in these products are being constructed on a broad front in the system of interbranch productions.

The new construction projects include the Ulyanov and Gryazi plants for hydraulic equipment, the Shakhty and Lyudinov plants for hydraulic equipment and the Simferopol plant for pneumatic equipment. The sizes of existing hydraulic equipment plants are being doubled or tripled -- the Yelets, Kharkov, Gomel, Shilute and also the Nikolayev experimental plant for lubricating systems, the Moscow Pnevmoapparat and others.

A high level of concentration (capacities of the enterprises are intended for an annual output of from 20 to 70 million rubles' worth of products) and efficient specialization, as a rule, have created conditions for large-series production. A clear example of this is the Ulyanov plant for hydraulic equipment, which by now has surpassed its planned capacity by more than two-thirds. The Nikolayev experimental plant for lubricating systems and the Simferopol plant for pneumatic equipment have also exceeded their planned capacities.

The volumes of production of hydropneumatic equipment during the 8th-10th Five-Year Plans in the system of interbranch productions has increased: for hydraulic equipment and fittings -- 10-fold, and lubricating equipment and filtering devices -- 9.5-fold.

#### Problems of Reduction Gear Construction

Along with the development of hydropneumatic drives, a significant place in machine building is occupied by equipment with a mechanical drive. It requires large volumes of reduction gears of various designs, sizes and capacities. The demand for them has also increased because the work for

comprehensive mechanization of production processes has become more active in all branches of the national economy.

The main volumes of production and the largest list of kinds of reduction gears are concentrated at enterprises that are included in the industry of interbranch productions (the Soyuzmashnormal' All-Union Industrial Association). The Izhevsk, Kiev, Leningrad and Barysh plants for reduction gears, as a result of expansion and technical re-equipment, have increased their capacities 2.5 to 3-fold.

As a result of organizational and technical measures, the output of reduction gears has increased from 200,000 a year under the 8th Five-Year Plan to 850,000 at the beginning of the 11th. More than 80 percent of the products in series production have been updated. They have stopped manufacturing more than 100 types and sizes of items for outdated designs.

Yet the need for reduction gears is increasing. They began to construct the Maykop plant in 1970. It is intended for producing large reduction gears with cog wheels having diameters of up to 1 meter, which weigh up to 1.5 tons. Subsequently, it was intended to organize the production of heavier items here, weighing up to 3 tons. They are widely used in pumping jacks for petroleum extraction, construction mechanisms, ship and port equipment and so forth. In the city of Volzhsk in the Mary ASSR they have been constructing a plant for producing cylindrical planetary reduction gears and engine reduction gears since 1979. But the new plants are being constructed extremely slowly. The normative time periods are not being met. Thus the Adygeypromstroy Trust (Maykop) of the USSR Ministry of Industrial Construction has failed to fulfill its planned assignments practically every year.

Unfortunately, this also happens: having displayed a special interest in the distribution of enterprises in industrial centers, the local agencies render all kinds of assistance in the construction of common facilities for the centers, but after they are introduced they lose all interest in the plant itself. After the Volzhsk reduction gear plant had fulfilled its commitments for the construction of common facilities for the center (water supply and sewerage, taking into account some of the needs of the city), the rates of its construction dropped inadmissibly. For 5 years the average annual volume of construction and installation work remained at 3-5 percent of the estimated cost of the facility.

They began to construct the Pskov plant for cogged wheels and reduction gears even earlier -- in 1968. The deadline for the startup of the full planned capacity for producing cogged wheels was put off until after 1985, and for reduction gears -- until even later.

#### The Development of a Base for Semi-Finished Pieces

As we know, the economics of machine building depends largely on the condition of the base for semi-finished pieces. Radical transformation of it is a most crucial problem. Now in operation or the stage of construction and renovation are the first 34 specialized enterprises for producing various kinds of blanks. They have a total planned capacity of 4 million tons of products, of

which 10 million tons will be produced by the Soyuzlitprom VPO [All-Union Industrial Association].

Specialized plants of regional significance for producing blanks are the first to be created. Hence the search for optimal specialization of production and expedient planning, construction, architectural and technological decisions.

A number of optimal capacities for both enterprises as a whole and shops included in them have been adopted as initial data: for iron smelting plants -- 90,000, 120,000, 150,000 and 240,000 tons of cast metal per year, and for shops 25,000, 30,000 and 40,000 tons. Decisions have been standardized for the siting of equipment and technological production flowlines, intershop and interplant transportation, outlines of general plans, and also production specialization and so forth.

In forging, specialization is being carried out for two kinds of equipment and technological processes, and in welding -- for various kinds of initial materials for welding (strips, sheets and rolled metal).

Under the 8th Five-Year Plan, construction was started in the Ryazan, Kashira, Gomel, Rustavi, Odessa and Kaunass central casting plants. Somewhat later, the Lipetsk and Charentsavan plants were started. The Moscow Stankolit plant and the Tbilisi Tsentrrolit plants are being renovated and expanded.

Under the 9th Five-Year Plan they began to construct the Kirov Tsentralkuz plant in Voroshilovgrad Oblast with a planned capacity for 150,000 tons of forged blanks a year and the Kalinin Tsentrrosvar, for 200,000 tons of welded blanks a year.

More than 85 percent of all the planned capacities are already in operation at iron and steel plants and also plants for aluminum casting.

The first plant to be introduced at its full planned capacity was the Lipetsk Tsentrrolit plant, and it was the first (close to the normative periods) to assimilate the planned capacity.

During the formation of an independent industry for interbranch productions it was assumed that conditions would be created for the more rapid development of enterprises that are included in it. They managed to achieve some positive results. But the rates of development of capacities for semi-finished pieces are clearly lagging behind what was planned. Construction has not been started on many plants.

Unfortunately, the situation has also changed radically at the Lipetsk Tsentrrolit Plant. Further expansion of it through the construction of a second shop for small smelting operations is proceeding inadmissibly slowly. Everything is leading to a situation where the normative time period for constructing a shop will be exceeded 3 to 5-fold. The completion of the work on the Kashira and Odessa casting plants is being dragged out. According to the estimate, the time period for their construction will be 22-23 years.

This kind of delay is fraught with serious consequences. Construction inevitably becomes more expensive and the planning decisions have to be revised. Nor can one forget about the moral damage: people begin to lose confidence in such progressive undertakings as centralized production of semi-finished pieces. The branches begin to look for new paths of development for the production of semi-finished pieces and, as a rule, they do not make the best decisions. And prolonged production activity under the conditions of a partial startup of the capacities has a negative effect on the economy of the enterprises. The production cost of the products is high.

One is alarmed by the situation not only in the specialized production of semi-finished pieces, but also in the base for semi-finished pieces as a whole, including the shops of comprehensive machine building plants. Plans for capital investments and the startup of capacities are not being fulfilled (during the 10th Five-Year Plan these plans were fulfilled by 80 and 85 percent, respectively).

A most important constituent part of casting production is the manufacture of molding materials. About 90 percent of the volume of their output is concentrated in the industry of interbranch productions. The list of these products has expanded considerably during the past few years. As the requirements for the precision and quality of the castings increase, so do those made on the molding materials. The volumes of production of dry and enriched sands and crushed quartz dust are increasing. The industrial production of concrete stone clay powders has been organized and assimilated for the first time. Deliveries of various kinds of pastes, dyes and other subsidiary materials are increasing.

The Balasheyskaya enriching factory for producing dry and enriched sands with an automatic continuous production process has been put into operation in the past 10 years, as have the Gomel' and Dashukov ore enriching combines (GOK), which are equipped with automatic lines. Construction has been started on the new deposit of the Millerovo GOK. The production of dry sands has been organized at the Lyuberetsy GOK. Existing mines are being re-equipped, and the application of hydraulic extraction processes is being expanded. Specialized dye productions are being created.

GOK's are to be created at the Igirinsk, Bas'yanov and Burtsev deposits. To give an idea of the scope of these, one can say that the cost of each enterprise ranges between 30 and 70 million rubles.

But, as in production of semi-finished pieces, construction times are being drawn out here too. In the majority of cases this is because of the poor preparation of the construction organizations, and sometimes their lack of desire to go into the remote areas where, as a rule, new deposits are located.

Enterprises that produce molding materials are significant consumers of rail transportation services. Each year they need the use of 300,000-350,000 cars, and at particular times. But because of the arrears in construction, cargoes are inevitably shipped over unnecessarily long distances and the loading of the transportation increases.

## A Specialized Branch for OMP Products is Needed!

/As a result of the organizational prerequisites that have been created, certain positive results have been achieved in the development of the OMP industry. But the difficulties and impediments, and above all the instability of development, hamper the creation of the necessary production ties between manufacturers and consumers of OMP products and potentially impede the perfection of the production structure in machine building./

An inadmissible tendency has been revealed: the annual plans include a considerably smaller number of new facilities (capacities) than are in the five-year assignment. Thus under the 9th Five-Year Plan, the annual plans included 54.5 percent of the facilities envisioned in the five-year plan, the 10th -- 18.7 percent and the 11th (before 1984) -- 11 percent. Hence the inevitable growth of arrears in the rates of formation of the branch.

On the other hand, capital investments are decreasing and general contracting organizations are not fulfilling the plans for construction and installation work, while deadlines for the startup of capacities are being postponed. All this exacerbates the situation.

The existing situation can be explained, in our opinion, only by an undervaluing (and mainly by planning agencies) of the production of OMP products. But, after all, they are intended for supplying hundreds and thousands of machine building plants!

Because of the need to step up the activity for specialization and concentration of the production of OMP products, the USSR Council of Ministers in March 1977 adopted the decree, "On Measures for Accelerating the Development, Improving the Organization and Planning Specialized Production of Products for General Machine Building Applications." It earmarked an entire complex of measures: organizational -- indicating the functions and obligations of all management levels; and production -- establishing the responsibility of individual machine building ministries, which have their own specialized enterprises for OMP products, for the technical level and quality. The Gosplan assigned specific kinds of items to the various branches. Measures were earmarked for establishing the technical policy in this area.

But the delay is continuing when it comes to a number of aspects. And mainly because the plan for the development of OMP products is being formed on two bases: first -- that regulated and controlled by the Gosplan, and second -- that which is spread throughout various branches for enterprises specializing in OMP products. Thus, this industry is not regulated as a unified whole on the level of machine building.

In addition to this, the level of work for solving the whole problem is gradually dropping. The special division in the Gosplan has been eliminated. Its functions have been transferred to a consolidated division of machine building, for which the formation of centralized production of OMP products is not the main task. The number of specialists working in this area who have accumulated the necessary experience is regularly decreasing, and their functions are limited.

This situation also influences the position of the Ministry of the Machine Tool and Tool Building Industry. Unfortunately, once in a while it too has a desire to form into a single unit the planning of capital investments for machine tool building and interbranch productions. Such an action would undoubtedly deprive the branch of its basis of existence, since the task of developing its capacities would no longer be the leading one and the interbranch productions themselves would gradually be assimilated.

The Ministry of the Machine Tool and Tool Building Industry, having at one time made a difficult decision to develop at the same time its own branch and a new branch which was not within its profile, has traveled a difficult path of creation. This path has always been complicated. It has required a good deal of time and effort, but it would take no more than a year to destroy all that has been achieved.

It is also necessary to take into account the fact that the branch for producing OMP products was created under the conditions of developed machine building with its established traditions, ties and concepts, at a time when the force of the psychological barrier and the departmental approach in all spheres of activity were extremely strong.

/The decisions of the 26th CPSU Congress recognized the need "to continue to expand specialization of machine building production, and to create new and develop existing specialized enterprises and large shops that manufacture blanks, parts, components and sets of equipment for branch and interbranch purposes."/

About 70 percent of the specialized enterprises existing in machine building for the centralized production of OMP products are parts of interbranch productions (in the system of the Ministry of the Machine Tool and Tool Building Industry). Their proportion is constantly increasing. By the beginning of the 11th Five-Year Plan, the proportion of centralized production of these products in the overall production volume amounted to:

	Share of centralized production of OMP products, %	Including proportion of interbranch productions, %
Hydropneumatic lubricating equipment and filtering devices	58	45
Reduction gears	69	90
Cast iron, steel and nonferrous metals	about 13	about 50
Molding materials (taking the Ministry of Ferrous Metallurgy and the Ministry of Nonferrous Metallurgy into account)	100	about 85

In parallel with the development of capacities of interbranch productions, engineering bases were created for planned, balanced development of the new branch. They carefully worked out the forms of organization, the sequence of assimilation of capacities, production ties and methods of changing consumer plants over to the supply of products from centralized specialized production lines, and also concrete methods and forms of conducting a unified technical policy.

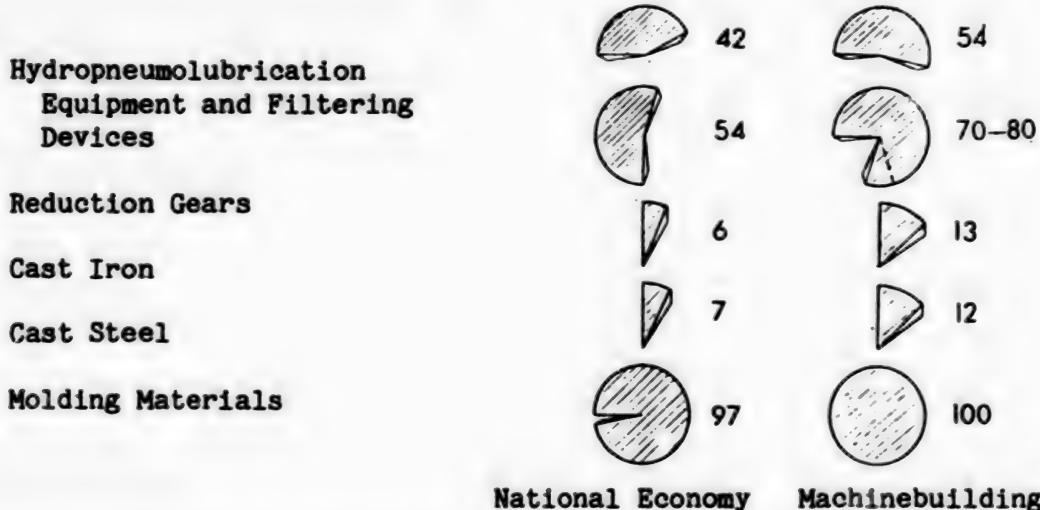


Figure 1. Satisfaction of Requirements for Producing General Machinebuilding Applications Accounting for Centralized Specialized Production Lines in 1980, in Percent.

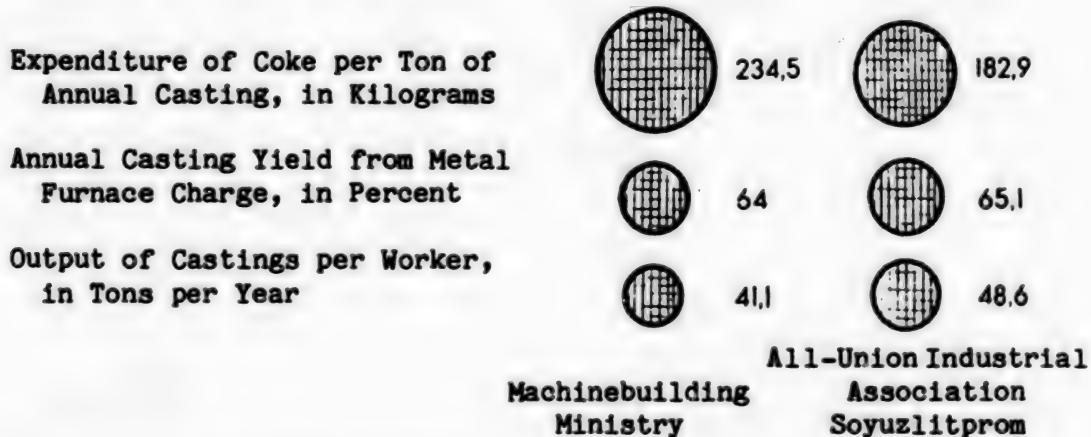


Figure 2. Indicators of Effectiveness of Casting Production

Some of the developments were examined by the board of experts of the USSR Gosplan, approved and used as a basis for further development of the branch, and some of them were approved by the board of the Ministry of the Machine Tool and Tool Building Industry with participation of the Gosstroys of the USSR and individual republics. A number of republics have considered the development of interbranch production lines which are located on their territories. They have considered a comprehensive target program for creation of the branch, assignments for machine building ministries for producing OMP

products, and certain measures for coordinating territorial and branch planning. And, finally, a plan is being drawn up for the development and distribution of centralized production of OMP products for the period up to the year 2000 (an independent branch plus specialized productions in the other branches). In order to determine the final indicator of development for each kind of product, technically expedient levels of centralized production have been developed for each kind of product. Thus from iron and steel cast pieces and hot stamped pieces, this is 50-55 percent of the overall volume, for hydropneumatic lubricating equipment -- 85-90 percent, and so forth.

/According to calculations of planning organizations, when the volumes and capacities of interbranch productions are brought up to the technically expedient level, the conventional release of people employed in the production of OMP products will amount to about 1 million./ The capital investments necessary for creating new capacities and organizing production ties will be recouped in 4-5 years. According to calculations, the overall number of plants that will have to be constructed will be 110-115, including 43 central casting plants, 20 central forging and welding plants, 20 plants for hydropneumatic and lubricating equipment, 4 for reduction gears, 6 for metal powder items, and 10-12 enterprises for producing molding materials.

And the main thing is the purpose of the branch. It should be for completing the equipment of other branches. Hence also the approach to its development: to keep pace with machine building. Readiness -- always! Possibility -- and then some!

Of course one cannot forget about those specialized enterprises for producing OMP products which already exist in the branch. They satisfy basically only their own needs. It is necessary to study their capacities and capabilities in order to organize deliveries to other branches. As experience suggests, the principle of branch plant activity should be: for themselves (basically) plus on the side (for other consumers). It would hardly be expedient to start over and construct the same kinds of plants in the various branches.

The entire complex of issues related to centralized production of OMP products should be concentrated in the USSR Gosplan alone. It would be expedient to restore an independent division. It is our conviction that this is a necessary measure.

An essential role should be played by the state board of experts of the USSR Gosstroy as well. I think that consideration of the plans of any enterprise, whether it produces its own OMP products or receives them from outside, should be conducted on the basis of branch and territorial balances of the production and consumption of them.

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## ODESSA INDUSTRIAL SITUATION CHANGES

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 35-43

[Article by V. A. Borisenko, head of the industrial division of the Odessa Obkom of the Communist Party of the Ukraine: "To the Territorial Agencies -- Not the Last Word!"]

[Text] During the years of past five-year plans, the appearance and character of industry in Odessa and Odessa Oblast have changed essentially. In addition to the traditional and widely represented enterprises of light industry, the food and other branches of industry for processing agricultural products, an increasingly large share and a leading role are being assumed by branches which largely determine scientific and technical progress -- machine building and instrument building. We are developing the production of high-precision milling machines, radial drilling machines, diamond boring machines and other machine tools with numerical program control of the "processing center" type, powerful modern hydraulic and diesel-electric cranes, unique electronic equipment for blast furnaces, installations for separation of air and gas flame processing of metal, and others.

Machine building is developing at extremely rapid rates in the oblast. The plans for the 11th Five-Year Plan envision growth in the volume of products of machine building and metal processing enterprises by an average of 26.8 percent.

In order to unite the efforts of scientists and production workers in the main directions of scientific and technical progress, we have drawn up a special-purpose interdepartmental scientific and technical program, Mashinostroyeniye, which was approved by the party obkom. About 100 enterprises, scientific research and planning and design institutes, bureaus and VUZes of 34 ministries and departments under union and republic jurisdiction, including 13 institutions of the UkrSSR Academy of Sciences, are participating in carrying out assignments under 10 divisions of the program.

Let us look more closely at the sections of the program that are related to specialization and cooperation in the production of products for general machine building use.

## Casting and Semi-Finished Pieces

During the past 10 years the production of cast pieces in Odessa Oblast has increased 1.5-fold, and those using progressive methods of molding formation -- 1.6-fold. Improvement of the technology of casting is proceeding in two main directions: the introduction of technological processes, materials and equipment that provide for obtaining precision castings as close as possible to the size and mass of the final part, and comprehensive mechanization and automation of the production of cast pieces, which make it possible to increase the productivity of the labor of casting workers and to free people from performing heavy manual operations.

Both of these directions are extremely promising. The subprogram Kokil'-85 envisions implementing before the end of the five-year plan more than 400 measures which will result in conventionally releasing 750 casting workers and saving 12,000 tons of metal, 2,000 tons of conventional fuel and 4.6 million kilowatt-hours of electric power. The first results are promising. Thus during 3 years of the five-year plan more than 350 workers have been released and 8,400 tons of metal have been saved. The overall economic effect has amounted to about 4.4 million rubles. By the end of the 11th Five-Year Plan, the production volume of cast pieces will have increased by 20 percent.

But the introduction of individual technical innovations and improvements cannot change the overall situation that has taken form in casting production in the oblast. The numerous casting shops which were constructed in prewar or postwar years as auxiliary services for machine building or repair and mechanics plants have long been hopelessly outdated. They are not able to provide for the production of the necessary quantity of high-quality cast pieces and, moreover, they significantly pollute the atmosphere of the city, for they are located mainly in residential zones. Of the 42 casting shops of the enterprises, 17 have capacities of up to 1,000 cast pieces a year.

The question of eliminating old foundries has been raised repeatedly. But they have not managed to solve it yet, although it has been and is possible to do this. The problem of arranging efficient interbranch cooperation and eliminating the departmental barriers that impede this has turned out to be difficult to resolve.

At one time, on a petition from the oblast organizations, a decision was made to construct a large casting plant, Tsentrrolit, in Odessa. When it was introduced, it was intended to close down the small casting shops of the enterprises in the Southern Industrial Region of the Ukraine, to strengthen the procurement base of machine and machine tool building, and to improve the working and living conditions of workers employed in casting production. After elimination of the sovnarkhozes, the new plant was transferred to the jurisdiction of the USSR Ministry of the Machine Tool and Tool Building Industry, which began to load it with orders for its own branch without always taking into account the principles of economy and expedience of one delivery or another, or the efficiency of the shipments. Products from the Odessa Tsentrrolit are now being sent to Yerevan (1,100 tons a year), Voronezh (1,940 tons), Baku (1,600 tons), Bobruysk (4,000 tons), Vilnius (1,700 tons) Ukhta in the Komi ASSR (200 tons), Vologda (1,200 tons), Novosibirsk (100 tons) and

even Komsomolsk-on-Amur (600 tons). At the same time, the Odessa plant for precision machine tools of the Ministry of the Machine Tool and Tool Building Industry ships in cast iron from Kuybyshev (RSFSR) and Charentsavan (Armenian SSR), from the Strelgovodavlika plant in Mogilev (Belorussian SSR), from Andizhan (Uzbek SSR) and Stavropol (RSFSR), and from the Orion machine building association in Moscow Oblast.

Is it permissible to waste money and transportation resources in this way? An analysis conducted by specialists of the region showed that of the 13,000 tons of iron and 8,300 tons of cast steel received by Odessa enterprises under cooperative delivery agreements, 8,600 and 1,500 tons respectively are manufactured by the local Tsentrolit. The elimination of just the inefficient counter deliveries associated with this would make it possible to release more than 300 railroad cars and reduce the production cost of the products a great deal.

It is necessary to be bolder in solving these problems, as was demanded by the November (1982) Plenum of the CPSU Central Committee, which pointed out: "It is necessary to increase the responsibility for observance of state and national interests and decisively eradicate departmental and local favoritism."

A very great deal depends on the position of the ministries, departments and planning agencies. For example, in 1981, on a petition from enterprises which was supported by the party obkom, the USSR Ministry of the Machine Tool and Tool Building Industry revised the plan for cooperative ties in Odessa and attached to the Odessa Tsentrolit the plant for milling machines imeni S. M. Kirov, which previously received cast metal from Armenia. Since these enterprises belong to the same ministry, it was not so difficult to do this. But when the interests of several ministries collide, the problem can go unsolved for years. It reaches the absurd. Two Odessa plants for trade and trade-technological equipment annually ship in 1,700 tons of cast metal from Kharkov and Kiev, and at the same time they receive 700 tons of cast pieces of the same kinds and parameters from the Odessa Tsentrolit.

How does one arrange more efficient and more reliable interbranch cooperation in casting production and avoid duplication and shipments of the same products in opposite directions, which is especially characteristic of oblasts where the "imports" of cast metal exceed the "exports"? In our opinion, it would be expedient to grant to territorial administrations of the USSR Gosnab the right to distribute the supplies of products produced by central casting industries.

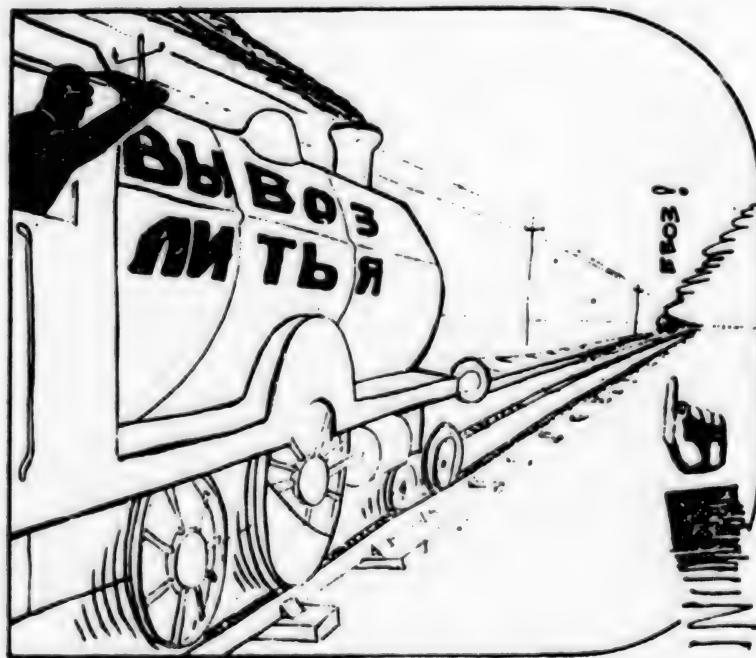
Of course the distribution is possible when the appropriate kinds of products are produced. But this approach would make it possible to revise the list of cast metal products that are produced and reorient it to a greater degree to the needs of Odessa and neighboring oblasts (Nikolayev, Kherson) which are served by the local Gosnab administration.

Centralization of the manufacture of cast parts for enterprises of the city and the region will make it possible to get rid of old foundries which have outlived their use. One of the possible ways of solving this important

economic and social problem is the construction at Tsentrrolit of a shop for small series and individual castings for the needs of local enterprises. It is necessary to return to the implementation of the previous rational idea to which the Odessa and other central casting industries owe their creation.

It is even more difficult to solve the problem with other kinds of semi-finished pieces -- forged pieces, welded parts and so forth -- than it is with cast pieces. It is well known that at many enterprises there is simply no production of semi-finished pieces in the modern understanding of it. And, of course, it is inexpedient to create such shops for every plant. We see the solution in the organization of special sections for producing semi-finished pieces, which would serve a group of enterprises. Thus at the plant for precision machine tools imeni XXV s"yuzda KPSS, where there is a section for producing screw blanks, they have assimilated the manufacture of blanks for parts which are made of long sheets of round metal. At the Pressmash production association imeni 60-letiye Oktyabrya, a section has been created for processing sheet metal by stamping. In the near future, it is intended to specialize the production of semi-finished pieces of the Kislorodmash scientific production association in the performance of welding operations, including in an environment of protective gasses and using gas cutting with equipment that has numerical program control; at the machine tool production association they are going to organize the manufacture of semi-finished pieces for parts like flanges, gears and so forth.

Specialization of the shops and sections, of course, is a step forward, but it will not solve the problem. What is needed are specialized enterprises like central welding and forging shops which are oriented toward satisfying the needs of the region.



Drawing shows crossing shipments of outgoing, incoming cast products

### Dispersion is an Impediment

Now, the plants are forced to load their capacities with items which could be manufactured more easily and simply at specialized enterprises. The M-6 bolts, for example, which the Orion association manufactures for its own needs, cost 9 times as much as they do at the neighboring Stankonormal' Plant of the Ministry of the Machine Tool and Tool Building Industry. The plant is also considered to be an interbranch industry, but it supplies its products only to enterprises of the Ministry of the Machine Tool and Tool Building Industry.

Is it really necessary to prove that it is economically disadvantageous and inexpedient to manufacture many kinds of metal ware, fasteners, forged pieces and welded parts at machine building plants? It is apparently necessary to organize in each region specialized production lines which would supply enterprises with such parts and items on order. They should also change over to a unified system of designation of these products, which would make it possible, with the help of a computer, to determine the needs of the enterprises for them and to organize series manufacture of items for interbranch use -- metal ware, gears, forged pieces and so forth.

Interdepartmental separation and the desire to manufacture everything for oneself impede the introduction of highly productive methods of reduced-waste production of semi-finished pieces, the creation of specialized productions for manufacturing items for interbranch use, and cooperative loading of capacities for the production of semi-finished pieces through orders from other enterprises, even though this was earmarked by the subprogram Mashinostroyeniye.

### The Responsible Mission of Gossnab Agencies

Territorial agencies of the USSR Gossnab can play an important role in the development of specialization and cooperation in products for general machine building applications and in strengthening interbranch ties. They must be not only the organizers and managers of the entire complicated process of material and technical supply for the enterprises, but also the inspectors for economical and efficient utilization of resources and reliable assistants of the collectives in providing for the production of everything necessary for fulfillment of the plans and socialist commitments. This requirement is set by life, and it is the same task that is set by the party obkom for the territorial administration of Odessglavsnab.

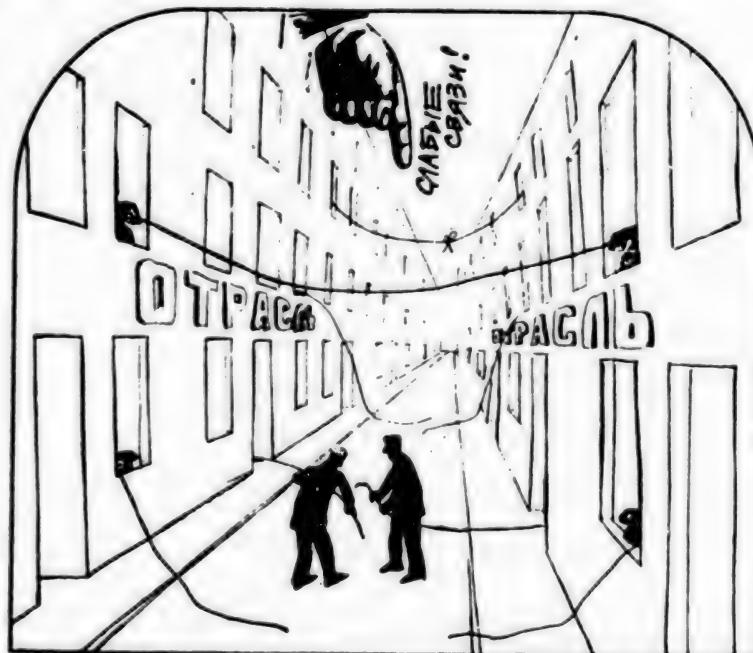
At our request, Odessglavsnab analyzed the utilization of scrap metal and other materials formed in the production process. Even the first results of the analysis showed that there are many cut pieces, scraps and corners which are usually sent off as scrap metal which could be utilized for manufacturing various parts at their own or neighboring enterprises.

At the suggestion of Odessglavsnab, a permanent exhibit of commercial scraps was opened in the city. Hundreds of orders for wastes come from the enterprises and organizations. But, unfortunately, they have failed to satisfy many of them. The fact is that with the existing procedure, it is

disadvantageous to the collective to send scrap metal to another collective, since it is then deprived of an important source of fulfilling the assignments for turning over scrap metal. We have not yet developed the system of legal, financial and material relations among those who give and those who receive commercial wastes for utilization in production. All this makes it more difficult to arrange efficient redistribution of them.

We see another most important reserve for increasing the effectiveness of production in the development of the system of services rendered to the enterprises by Gossnab agencies. We are speaking about the creation of an interbranch enterprise, Metalloservis, which will take responsibility for all operations related to the sorting and preparation of metal for production. Several sections like this are already in operation. And in 1985 a regional Metalloservis center should be introduced. It will perform for the enterprises the cutting of pieces and some of the stamping of parts from sheet metal, the manufacture of bent profiles, the trimming and cutting of round rolled metal and reinforcement metal, and so forth.

Specialized production lines which would supply the enterprises with metal ware, forged pieces, fasteners and so forth could also be under the jurisdiction of the USSR Gossnab and its territorial administrations. In a word, a real path to developing cooperative services lies in increasing the role of Gossnab agencies.



Drawing indicates "weak connections" between industry branches

#### Interbranch Ties Should Be Strengthened

Successful implementation of interdepartmental target oblast scientific and technical programs depends largely on support and assistance from republic and union ministries and departments. It is gratifying that with many of them we

have arranged good business ties and contacts at all levels. Thus the USSR Ministry of the Machine Tool and Tool Building Industry included in the work plan for the Scientific Research Institute of Special Casting Methods and the Scientific Research Institute of Machine Tools and Instruments assignments which were given to them as head organizations of the subprograms Kokil'-85 and Stanok-85. The UkrSSR Gosnab is helping to organize interbranch productions in Odessa and to arrange a system of cooperative services.

The development of services is being held up by a lack of methodological materials for their organization and normative documents for determining the savings from service preparation of products. These issues deserve the constant attention of the USSR Gosnab, Gosplan and State Committee for Labor and Social Problems. Frequently, the strengthening of interbranch ties is also impeded by interruptions in material and technical supply for the enterprises and failures to make deliveries, for which the executives do not bear the proper responsibility.

These and other shortcomings in planning and management were discussed pointedly and in principle at the Plenum of the CPSU Central Committee. General Secretary of the CPSU Central Committee Comrade K. J. Chernenko, at the pre-election meeting of the voters of the Kuybyshev electoral district in Moscow, emphasized that "the development of economic initiative and creativity at the levels of economic regions, associations and enterprises constitute one of the most important tasks and it is a statewide concern."

Today, the party obkom is directing the efforts of communists and all workers of Odessa Oblast toward a decisive elimination of the barriers which impede the acceleration of the rates of intensification of the economy and rapid and widespread introduction of the achievements of scientific and technical progress.

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## POSSIBILITIES OF INTERBRANCH PRODUCTION ASSOCIATIONS EXPLORED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 44-50

[Article by V. Ya. Semenov, candidate of economic sciences, general director of the production association for lubricating equipment (Nikolayev): "We Suggest Interbranch Production Associations!"]

[Text] Modern lubricating equipment can produce a significant economic and social effect if the efforts of the interested parties are concentrated on solving problems related to the development of its production. For the reliability, durability and productivity of the equipment that is produced depend on the technical level of the equipment which places the lubricant in the friction components of machines and mechanisms.

Recently specialists in the majority of countries of the world have been attaching special significance to problems of tribotechnology (sciences dealing with questions of friction, wear and lubrication) and the production of lubricating systems.

The Nikolayev association for producing lubricating equipment is the largest producer of specialized equipment of this kind in the country. The association was formed from the following: the Nikolayev experimental plant for lubricating systems -- the head enterprise; the Bryankov plant for filtering equipment (Voroshilovgrad Oblast); the Transcarpathian plant for components and parts of lubricating equipment; and a specialized plant for producing parts for lubricating equipment. The association also includes a special design and technological bureau for lubrication equipment and filtering devices which is the leading one in its branch for this problem.

The establishment and development of the association, which was created in 1973, took place under difficult conditions: the growth of production had to be combined with a rise of the technical level of lubrication systems. The country's machine building was experiencing a critical need for progressive lubrication equipment. Certain kinds of equipment which were up to the world level in terms of their basic characteristics were not sent for export simply because the lubrication systems were imperfect.

The head plant was in a difficult situation. On the eve of the 9th Five-Year Plan, almost all of its products were obsolete. The strategic goal for the enterprise was formulated in the following way: "Of the 92 base models produced by the plant, 80 are to be replaced by new and better ones, and steady series production is to be arranged for them." The implementation of this task led to rapid development of the plant, and to its growth into a production association which today produces not individual lubricating devices, but complete automated lubricating systems (ASS). The systems provide for precise dosing of the lubricating material and continuous automated control over a given routine (and, if necessary, remote notification of a breakdown).

The entire process of the association's development over the past years has become possible because of the extensive application of target programs. There is something for us to discuss here, but that is a separate subject.

We single out programs on three levels.

First -- the target technical programs which are directed toward solving individual problems, for example, research and development of new kinds of lubricating systems.

Second -- the target program for the development of the enterprise.

Third -- the interbranch comprehensive scientific and technical program, Smazka, which was developed in 1980. After evaluating the different variants, the goal of the program was formulated as follows: "To create and assimilate the production and operation of a complex of standardized components for automated lubrication systems which provide for reducing the proportional energy expenditures and metal-intensiveness of machines and increasing the reliability and durability of friction components of machines."

One of the important programs of the first level was the Pitatel' program, which was directed toward creating a new design for one of the components of the automated lubrication system. The largest of the recent programs of the first level is the Fil'tr program, which set the goal of assimilating fine cleaning filters, since the design of the items of the previous generation, which had been produced for 10 years, was outdated.

From the second level, one should single out the program Nasos. Its goal was to restructure the specialized section with a 10-fold increase in the output of products and a 40-percent reduction of the labor-intensiveness of their manufacture.

A considerably larger group of workers was enlisted to implement the Nasos program. It turned out to be fairly difficult because it was necessary to break down the established tradition of pump production. The implementation of the target program made it possible to double the output of SN-5 pumps as compared to the level envisioned by the program, and to reduce labor-intensiveness by 52 percent. These pumps were awarded the State Emblem of Quality.

The Kremlevskiy kuranty, a program of the second level, is interesting. It is devoted to the development, manufacture and assembly of a complicated automated lubrication system for the country's main clocks.

The target program approach has made it possible, with an 18-fold increase in the production volume as compared to 1965, to create principally new technical equipment.

Automated lubrication systems have been created on the module (block) principle, and this opens up the possibility of specialization in components and parts in their production and interbranch unification. From 18 blocks, it is possible to arrange any number of automated lubrication system models for the most varied machines and mechanisms.<sup>1</sup>

It is known that the block system for the construction of any technical system helps to solve two most important problems -- providing for compatibility of small and large systems and creating the possibility of continuous improvement of the systems.

Machine builders who have become familiar with the advantages of using the automated lubrication systems have demanded a sharp increase in their output. On the basis of an analysis of orders from consumer plants of 11 machine building ministries -- Minstankoprom, Mintyazhmash, Minstroydormash, Minenergomash and others -- the need for the automated lubrication system was determined in the following volume: for 1985 -- 120,000 (we will be able to manufacture only 57,000 and so the shortage will amount to 63,000) and subsequently the need will increase to 230,000.

When conducting a joint analysis of the needs of machine builders of the CEMA countries, we became convinced that there was an even greater sales market for the automated lubrication system. By creating modern lubrication systems, it is as though we "put ourselves under the gun." Now life demands that we satisfy all of the needs that have been revealed. Moreover, we have encountered something else which, in our opinion, is a problem. Even if we could manage to organize the delivery of lubrication systems to all the ministries from one association, they still would not be introduced since the consumers are not prepared for their application.

For example, we now deliver 98 percent of the systems to the Minstankoprom, and we are constantly having to train the consumers, although the training has been in progress for 10 years already. It is necessary to organize regional centers in the country for servicing lubrication systems and training the consumers.

In general, the situation for satisfying the needs for the automated lubrication system is a complicated one. What paths can be taken to solve the problem? An analysis has revealed five possible variants of the solution.

Variant I. Each branch provides itself with all kinds of progressive lubrication systems in the complete volume needed. Of course, it is the best at taking into account the needs of its enterprises and closely coordinates the production of lubrication systems with the production of its main product.

But this variant has serious shortcomings: in the first place, each branch will strive to carry out its own technical policy in the area of lubrication equipment, since the designs of lubrication systems make it possible to use them for any equipment, regardless of its functional properties. In the second place, significant expenditures of time and resources are required to create a specialized production line of all kinds of lubrication systems. In the third place, simultaneous creation of the production of all kinds of progressive lubrication systems in various branches will lead to parallelism in their work. In the fourth place, in order to serve its own customers, each branch in each region of the country should have its own repair and operations base.

Variant II. One can take the path of increasing the specialized capacities for producing lubrication systems in the Minstankoprom, that is, at the Nikolayev association. But analysis has shown that one ministry and one city do not have sufficient resources to provide for the necessary increase in capacities in a short period of time. Moreover, concern for satisfying the needs of other ministries for lubrication equipment ends up being contradictory to the main task of the Minstankoprom -- the task of producing machine tools and forging and casting equipment.

Variant III. There are plants in the branches which make some kind of lubrication equipment or have something to do with lubrication. It is necessary to select several of these plants and, on the basis of these, create a main board and place it under the jurisdiction, for example, of the USSR State Committee for Machine Building, which would unite all branches of machine building. This would make it possible to eliminate departmental favoritism. But to do this it would be necessary to create the Gosmash first!

Variant IV. Lubrication systems are among the products for general machine building use. In order to develop efficient interbranch productions, it is necessary to create a special branch (ministry) which would embrace all plants of various machine building ministries which produce devices and parts with the same functions, and then consolidate these productions. To do this, it is necessary to select existing shops and plants from many ministries or else rapidly construct new ones. But analysis shows that there are at least three basic negative aspects of this variant. First, it is practically impossible to take a vital system of ties and relations in each branch which is based on characteristics of the design of their own components and parts which have been developed over the years, and put a stop to it or transform it without losses. Second, the new branch would be difficult to manage, since in order to produce almost 60 percent of the components and parts of machine building, it would have to become the largest of all the existing branches both in terms of capacity and in terms of numbers of workers. Third, so far there is no technical basis for centralized production -- unification and normalization of all components and parts -- even at the branch level, not to mention the interbranch level.

Variant V. (in our opinion, the most practical). To create an interbranch production or scientific production association. Interested enterprises of various ministries which would enter such an association on a shared basis, would design, combine and test systems, and also manufacture individual parts

and components from a limited list of products and deliver the systems to the corresponding consumers, even if they are only from their own ministry or region, and deliver the parts and components to one another.

The lack of legislation concerning the participation of enterprises in joint work is a minus for this variant. But there are decisions which make it possible for the enterprises to establish direct cooperative ties. These decisions create a legal basis for concluding long-term agreements among enterprises of various ministries. The technical basis for cooperation is the module principle of design for components and parts of lubrication systems. For example, automated lubrication systems are formed from 3 pneumatic, 12 hydraulic and 3 electronic blocks, which, in turn, are comprised of standardized parts.

As analysis has shown, when this variant is realized it is also necessary to create additional production capacities and designers must contribute more work. Still, on the whole the capital investments are considerably less than usual, since existing plants have already arranged some kind of production of lubrication systems. The variant deserves attention also because it contains the basis for improvement of socialist cooperation in labor.

In order to implement the proposed solution, one can initially conduct an economic experiment on the basis of our association. In essence, we have already begun. Taking advantage of the rights of enterprises and all-union industrial associations, we have reached an agreement to work on a cooperative basis with the Stavrov plant of the Minavtoprom. This work enabled us, during the period from 1979 through 1982, to increase capacities as a result of cooperation by 5.4 million rubles and to increase them by an equal amount as a result of technical re-equipment. During the 2 years of the 11th Five-Year Plan practically all of the growth of the production volume (17.6 percent) was achieved as a result of increased labor productivity, which amounted to 17.1 percent.

The agreement with the Stavrov plant for automotive tractor equipment of the Vladimir Avtopribor production association of the Minavtoprom for reciprocal deliveries of components and parts for automated lubrication systems was concluded in March 1979. The right to conclude such an agreement was granted to us by the 1977 decree of the USSR Council of Ministers concerning the development of products for general machine building applications, whereby the Minstankoprom, the Minavtoprom and the Mintyazhmash were designated as the ministries responsible for the development of the production of modern lubrication equipment. For 4 years now the contractual conditions have been met precisely by both parties, on the basis of component-by-component and part-by-part specialization. Both parties have benefitted from reducing the list of their products and increasing the proportion of series production.

But nonetheless, it turned out to be easier to arrange cooperation than to overcome the psychological barrier of mistrust in it which has been built up over the years and decades. Not wanting to risk everything on the agreement, the Stavrov plant at the same time ordered special equipment for itself to produce parts for impulse systems for lubrication, and it received this equipment ... 3 years later. But the cooperation turned out to be reliable.

Now the question arises as to what should come next. Is it worthwhile for them to assimilate the production themselves when there is actual cooperation between the plants, or should they sell the equipment? To whom? We will have no use for it either in the next 5-7 years.

This example shows how widespread is the principle of doing everything for oneself. I think that interbranch production associations, on the basis of cooperation, will make it possible to overcome this tendency.

#### FOOTNOTE

1. Semenov, V. Ya., Kurganskiy, P. M., et. al., "Avtomatizirovannyye smazochnyye sistemy i ustroystva" [Automated Lubrication Systems and Devices], Moscow, Mashinostroyeniye, 1982.

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## CENTRALIZED CASTING ENTERPRISES DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 51-59

[Interview with Aleksandr Nikolayevich Sagura, director of the Odessa Tsentrrolit enterprise by EKO correspondent Ye. Leonidova: "Centralized Casting Enterprises in Plans and in Life"]

[Text] The Odessa Tsentrrolit is the largest of the specialized enterprises for centralized production of cast pieces in terms of its production volume and it is one of the leading ones in terms of its technical level. Its planned capacity is 134,000 tons of cast metal a year. By 1983, capacities for 123,000 tons had been introduced and they had been assimilated by 83.9 percent.

The problems of the development of the Odessa Tsentrrolit are largely typical of other centralized industries for producing semi-finished pieces. These are discussed by the director of the plant, Aleksandr Nikolayevich Sagura, in a conversation with our correspondent.

[Question] Aleksandr Nikolayevich, plants for centralized manufacture of cast pieces have been developed most among the specialized enterprises for producing semi-finished pieces. What role do they play in the development of the machine building complex?

[Answer] Enterprises for cast blanks have formed an independent subbranch within interbranch productions -- the all-union industrial association Soyuzlitprom, which includes 10 centralized casting enterprises and also the Kalinin Tsentrrosvar and the Kirov Tsentrkuz in Voroshilovgrad Oblast. This fact shows that specialized centralized production of cast pieces has been developed much more than other kinds of production of semi-finished pieces.

Centralized foundries are a progressive phenomenon. The time that has passed since their creation has convinced us of this (basically, they began to be constructed in the 1960's). It became possible to conduct a unified technical and planning policy in the area of production of cast pieces and to arrange cooperative ties. It is becoming advantageous to introduce progressive and

special methods of casting, since expenditures on them are recouped because of the large batches of items that are produced.

Conditions for the labor of foundry workers have changed. There is now a high level of specialization and automation at specialized foundries, including in molding -- one of the most labor-intensive operations. Of course, we have not managed to get rid of the dust and gas pollution completely. As long as we use traditional molding materials for molding blanks -- sand, clay and earth -- and as long as we do not sharply increase the volumes of progressive methods of casting in molds, investment patterns and so forth, certain unattractive aspects of casting production will remain, although, of course, the working conditions in the specialized plants and the old foundries are as different as heaven and earth.

Machine tool building enterprises, for example, can no longer conceive of work without centralized foundries. Take the Krasnyy proletariy or the plant imeni Sergo Ordzhonikidze. They are located in the central regions of Moscow. They obtain all their large castings from the Moscow Stankolit. Our plant supplies cast pieces to machine builders of Odessa, Kiev and other cities.

[Question] So you are another Stankolit?

[Answer] No, I would not say that. True, we deliver an average of 60-65 percent of the cast pieces to enterprises of our own branch, but still among our customers are the Minsel'khozmash, Minlegpishchebytmash, Minneftekhimmash, and other branches. About 165 machine tool building and machine building enterprises are clients for our products.

During the 10th Five-Year Plan we grew in terms of sales volumes by 72 percent and in terms of labor productivity by 45 percent. For the results of the five-year plan, the plant was awarded the Order of the Labor Red Banner. By the beginning of the 11th Five-Year Plan we were annually producing 95,000 tons of cast metal, and in 1984 we shall produce 108,000 tons.

[Question] But still, so far as we know, the plant deliberately operates at a loss! And the production cost of certain semi-finished pieces is higher than it is in foundries of machine building plants!

[Answer] It depends on how you calculate production costs. At machine building plants only shop expenditures are planned for foundries. At centralized foundries, understandably, it is necessary to take into account all expenditures for the plant as a whole -- for the complete production cost.

One of the main reasons for operating at a loss is that the plant has not yet reached its full capacity, although construction began on it in 1962. At that time, by a decision of the Chernomorsk sovnarkhoz, the plant was created, taking the interests of the territory into account. This the equipment was selected and the list of products was formed. And it had to produce its first products as part of the interbranch industries of the Minstankoprom in 1966. The list of products has changed sharply. It was necessary to revamp the plan and the existing capacities. Moreover, the long time required for construction led to making the plans outdated. We began to renovate certain

shops which had just been put into operation. And this too meant additional expenditures. True, during the first 10-15 years the rates of construction were higher than they are now.

[Question] What can explain this?

[Answer] In my opinion, it is not only that the volumes of capital investments have decreased. The Basic Directions for the Socio-Economic Development of the USSR During 1981-1985 and the Period up to 1990 clearly state that capital investments should go first for technical re-equipment of existing enterprises and completion of construction of facilities that have already been started. It seems to me that in our ministry, there has been a redistribution of capital investments within the branch. The ministry again prefers to construct foundries at machine tool building plants and is trying to give more capital investments to machine tool builders. It is difficult to reproach them for that. The ministry is afraid that the specialized plants will be taken away. After all, the Tikhvin Tsentrrolit was transferred to the Leningradskiy metallichесkiy zavod association of the Mintyazhmash. Where is the guarantee that other enterprises will not end up the same way?

Of course, it is necessary to complete the construction of foundries more rapidly and bring them up to their planned capacities. Otherwise, they will operate at a loss and doubt will be cast over the idea of specialization.

Incidentally, our plant was profitable at one time. We received a profit for the first time in 1979 -- 816,000 rubles. In both 1980 and 1981 we received 1.6 million rubles. In 1982 new wholesale prices were introduced and we again began to operate at a loss, since the cost of the initial materials -- metal, supplements, molding sand and the cost of equipment -- increased disproportionately to the new wholesale prices for our products.\* The ministry, in order to ease the situation of the plant, permits us one-time prices for cast pieces delivered under orders. But that is not the point. The enterprise should produce a profit; it should be profitable. Without this there is no motivation for the development of initiative. Only when the collective can independently control the economy of its industry, when it knows that efficient methods of management will enable it not only to fulfill its duty to the state, but also to create its own incentive funds -- only under these conditions does initiative develop along with a need to find effective ways of management. If you will be operating at a loss, no matter how hard you try, and if the losses are planned and covered, what is the point in searching?

In principle, in my opinion, there should be no businesses that operate at a loss. Any production should produce a profit. It is now clear to everyone that the price list for cast pieces which was developed by the GiproNIIIMash and published in 1981 was a failure. More than 10 additions have already been

\* From the editors: The new wholesale prices for semi-finished pieces turned out to be lower, and they artificially create losses. At the ZIL, the new price for cast metal in tons is 304 rubles, and the old price was 335, for hot stamped pieces these prices were 338 and 406.4, respectively.

made to it. And it requires further improvement. But this is not the main thing. We see the main reserve for eliminating losses in the utilization of existing organizational-economic and technical resources.

[Question] We should like you to say more about these reserves.

[Answer] First of all, there is scientific and technical progress. The fact that during the past 10 years in the country there has been considerable development of the branch of casting machine building exerts a marked positive influence on the technical level of foundry production, although in terms of individual positions casting equipment is below the world level. I was at the international congress of foundry workers in the United States, was interested in becoming familiar with the exhibit of casting equipment, and saw a good deal that was new. But we certainly cannot purchase everything for currency. Therefore we took the direction of technical re-equipment: to work in contact with casting machine plants, and to maximally standardize the equipment we use, reducing the number of suppliers, of which our plant has too many.

We had the opportunity to fill the plant with equipment from the GDR and Czechoslovakia. The imported equipment is effective in operation until the first capital repair, and then there arises the problem of spare parts and batching items. Then we offered ourselves to the Novosibirsk Siblitmash plant as a testing ground for the new technical equipment they created. The work began with the shop for cast steel, which we decided to equip completely with equipment from the Siberians. True, the first molding line did not work. But, as they say, one learns from mistakes. All the design shortcomings which were revealed in it were taken into account by the machine builders when they were working on the new variant of the line, and it proved itself well in operation since it was based on the sensible technical idea of separation of operations. Previously there were only 5-6 operations. Only one component had to break down in order for the entire line to come to a halt. Now the components can be repaired individually.

We have an agreement for technical cooperation with this plant. We are fully aware that there can be design errors or simply incorrect solutions in the prototypes. Nonetheless we have gone this way, and certainly not out of altruistic considerations. We gain a direct advantage from this cooperation. In the first place, we are able to keep up with the technical research of the machine builders and can influence them and suggest our ideas. In the second place, we receive new technical equipment before other enterprises do. In the third place, our specialists and workers improve their skills because you never learn this much about new technical equipment if you receive it when it is finally ready. And when people participate in the development, they have an organic appreciation for every part, every little screw of the machine. Although it is a new one, this machine is their own, and it is understood and accessible as a book that has been read.

And in general, the important thing is not that plants which produce new technical equipment do not have an experimental base and cannot test the prototype of an item. They frequently bear a stillborn brainchild. Centralized foundries lose a good deal of time on installing equipment that will not work, and no less on getting rid of it -- disassembling it, cutting

it up, and sometimes tearing out the foundations -- under the conditions of a shop that is in operation.

In the shop for medium cast iron, on the basis of new technical equipment from Siblitmash, we replaced the transportation system for the molding equipment and installed a mechanized dressing-off complex from a Pinsk plant. As we know, dressing off -- eliminating burrs, metal deposits and so forth from the cast pieces -- is a very labor-intensive process which does not submit well to mechanization. The dressing-off complex made it possible to sharply reduce manual labor and to improve working conditions.

At the enterprise a great deal of attention is devoted to the introduction of progressive casting methods. The work is being done in cooperation with the Odessa Scientific Research Institute of Special Casting Devices. In the small casting shop we have introduced mold casting and made this into a separate section. In this section they cast brake drums for tractor trailers.

The most difficult problem is mechanization of the production of large cast pieces. We were the first of the country's foundry workers to attempt to do this on a flowline. In 1982, in the shop for large cast iron pieces we put into operation a complex mechanized flowline, which enabled us to change over to casting pieces weighing up to 3 tons in small series.

The introduction of the building for auxiliary shops was very important for the plant. It included the pattern, instrument and mechanics shops, the repair and energy base and the fittings shop.

The introduction of progressive technological processes will contribute to reducing expenditures on production. The plant has the lowest expenditure of molding sand per ton of suitable cast metal. Therefore, with a constant growth of the production volumes, the consumption of sand has been decreasing for several years now. As we know, there is now a great shortage of molding sand. The result was achieved because of the introduction of reduced-waste technology for molding, which our planning and design bureau developed in conjunction with the Odessa Institute of Casting. Usually 50 percent of the mixture is returned after molding. We return 80 percent of it to be used again. The composition of the mixture we have developed is patented. The advantages of repeated utilization of molding mixtures are immense. In addition to reducing the demand for molding sands, transportation expenditures on shipping them and gathering up the wastes of burnt molding materials have been reduced. The plant has been made the base enterprise for solving this technical problem.

[Question] The decree of the CPSU Central Committee and the USSR Council of Ministers concerning improvement of the economic mechanism (1979) provides incentive for economizing on metal. Foundries are large consumers of metal. What are you doing to save on it?

[Answer] The work is proceeding in two directions. First: increasing the output of serviceable cast metal from a charge by reducing losses from defective work, improving the designs of pouring systems and, the main thing, through progressive technology for forming pieces -- casting in a mold and

continuous and centrifugal casting. The second direction is characterized by a reduction of the mass of the cast piece itself. But today no foundry worker has any doubt that the basic measurement for the output of cast blanks -- the ton -- impedes the introduction of the achievements of technical progress. The idea that the heavier a part is, the better it is has already become a part of the flesh and blood of casting specialists. And it is necessary to counter this idea with a better system of price setting and planning of the production activity of foundry workers. There is now a need for direct encouragement of making the mass of the cast piece as close as possible to the mass of the prepared item.

Planning comes somewhat closer to this goal through evaluation of the fulfillment of the plan according to the NChP [Normative net output]. But so far, there is no direct incentive to reduce the mass of the cast pieces. Nonetheless we have engaged fairly actively in solving problems of economizing on metal. During the past several years, the weight of cast pieces in the annual output has decreased by 3,000 tons.

But we also have our specific problems which make it more difficult to obtain high results from the achievements of technical progress and to eliminate losses. The main one of these is the shortage of personnel. Because of the staff shortages in the medium casting shop we cannot bring its output up to the full capacity.

[Question] What, in your opinion, must be done to bring it up to full capacity; where do you see the solution to the problem?

[Answer] Before speaking about methods of solving the personnel problem, I should like to note that this kind of situation with personnel exists at other plants as well.

It seems to me that the number of working positions has been inflated in some places. In some places, by hook or by crook, they try to keep the old foundries, which should have been closed down long ago, as has been suggested hundreds of times by the sanitary and epidemiological service. But machine building plants want to hold on to their own "natural businesses." Thus an artificial shortage of personnel is created. In our opinion, a correct solution can be found in specialization and cooperation of production, and the creation of centralized interbranch industries for semi-finished pieces and batching items, with a simultaneous elimination of the outdated shops.

As for our enterprise specifically, we may have only one line -- increasing labor discipline and retaining personnel by finding better solutions to social problems. The human factor, as was emphasized at the June (1983) Plenum of the CPSU Central Committee, exerts a decisive influence on production.

[Question] One who knows your plant gets the impression that here a good deal of attention was devoted to social and domestic problems previously as well. The polyclinic, the greenhouse, the hothouse, and the sports facilities are features which can be found in far from every plant ...

[Answer] We try to assimilate capital investments comprehensively because if during the period of construction of production facilities we do not create all of the necessary social and domestic infrastructure, we will not be able to do it later. The situation is familiar. None of the plants that have been constructed, if they have put something off until "later," until they have gone into operation fully, have been able to obtain the planned social and domestic facilities for many long years, or else they have not been able to obtain them at all.

First of all we made sure that the shower rooms, dressing rooms and dining rooms were constructed not according to a temporary plan, but the way they were supposed to be. Then we thought about those facilities we could not do without. Centralized foundries are special enterprises, and because of their ecological characteristics they cannot be constructed near residential areas, and therefore they grow up on the outskirts of cities. For many years our plant was considered to be outside the city. Recently a large residential area has grown up not far away from here, and they have built trolley lines from there to our plant. For many years city passenger transportation did not come this far. We brought people in with our own transportation.

When it is this far away, one must make sure that the people can obtain all the necessary services at the enterprise. Therefore, in addition to the dining room we built a grocery store and organized trade in semi-prepared meat products. The hothouses supply the collective with fresh vegetables all year long. We have created a greenhouse in order to plant greenery around the area so that it will be like a southern city and also so that Tsentrrolit will look as nice as plants of other branches do. It is necessary for people to find it pleasant at work. For they spend a large part of their waking hours here.

The polyclinic was constructed so that the workers could undergo preventive treatment. Therefore in addition to specialized facilities we have created a physiotherapy hospital. A sports hall has been created for the youth. At the request of rayon organizations, we have allowed training of dozens of rayon sports sections in it during the day. Let the children in the nearby schools learn the way to Tsentrrolit. We see our future reinforcements in them. Young Tsentrrolit families have never had any problems with kindergartens or day nurseries.

Many facilities have been constructed through our own efforts -- by the internal resource method. Otherwise we would not have had half of what we have now. Of course, our path has not been strewn with roses. We have been penalized more frequently than we have been helped. But unpleasantness is forgotten and good structures remain and will serve the collective for many long years.

The most critical social problem for us has been housing. It is difficult to retain personnel without solving it. Of those who have departed, 90 percent gave the lack of housing as the reason. Young specialists who are assigned to us leave after they have worked out their appointed time and have acquired experience. And we are not in a position to retain them because we cannot offer them housing. If we were given the money to construct buildings for small families we would be able to retain young specialists.

As of today, the personnel shortage amounts to 300 people. In addition to staffing the second shift of the medium casting shop, we must find personnel for the shop for special casting methods which will be introduced by the end of the five-year plan. We will not be able to do this without housing. In our opinion, the housing norms for newly introduced production lines for semi-finished pieces should be different from those for ordinary enterprises.

There is one other problem which affects the retention of personnel -- the payment of a remuneration for length of service and additional vacations. Metallurgists have them, but foundry workers do not. And foundry workers are the same as metallurgists.

But the most important thing is not to prolong the construction periods. Then it is possible to avoid many technical and personnel problems.

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## UNIFICATION OF MACHINE BUILDING PRODUCTS EXAMINED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 60-65

[Article by V. N. Shatulin, candidate of technical sciences, administration chief of USSR Gosstandart, and S. V. Kreyter, candidate of technical sciences, division chief of VNIINMash under the USSR Gosstandart (Moscow): "Factors Impeding Unification"; passages enclosed in slantlines printed in boldface]

[Text] We wanted to begin the discussion of problems of standardization and unification of products for general machine building use with one remarkable fact. On the initiative of the USSR State Committee for Standards, the machine building ministries, the central board for scientific organization of labor of the machine building ministries and the VDNKh SSSR [All-Union Exhibition of the Achievements of the USSR National Economy], we held the 4th all-union competition of the best work for unification and the formation of sets of equipment in machine building and instrument building. The most interesting developments, which earned the competition award, were exhibited at the VDNKh SSSR.

Thus the Saratovdizel'apparat production association of the Mintyazhmarsh exhibited at the competition unified speed regulators for sets of various kinds of diesel equipment with capacities of from 300 to 4,000 horsepower, including for the main diesel engines on ships, diesel engines for steamers, drilling rigs and so forth. Their introduction made it possible to reduce expenditures on planning, preparation of production and series output of products by 824,000 rubles, to considerably increase the service life of the regulators, and also to organize specialized production of them. The annual economic effect amounted to 1.9 million rubles.

The Leningrad metallichесkiy zavod production association exhibited unified high-pressure oil receivers for hydraulic turbines. The level of interplan unification was raised to 87.8 percent.

The All-Union Scientific Research, Design and Technological Institute of Hydraulic Machine Building (VNIIGidromash) of the Ministry of Chemical and Petroleum Machine Building showed the development of unified centrifugal single-block pumps based on centrifugal console pumps. The work for unification has made it possible to reduce the list of constituent parts to

two-thirds - one-half of the previous number, and to reduce their metal-intensiveness by 4,000 tons a year and the need for electric energy by 122 million kilowatt-hours a year, with an annual economic effect of 2 million rubles.

In the book of remarks, visitors to the VDNKh noted how important it is to conduct such competitions and exhibitions in the interests of exchanging advanced practice. At the same time, the critical remarks were also of interest. Especially important, in our opinion, was the entry from an engineer from Dnepropetrovsk, S. I. Zhilin, who wondered why there were no work projects for unification of items for general machine building use (OMP) -- the most widely used items in machine building. Although there was unification of OMP products in the aforementioned works -- reduction gears, hydraulic cylinders, pumps and other items -- it was of a branch and intraplant nature, and not interbranch. Therefore Zhilin's remarks were quite justified.

Various sources estimate the proportion of OMP items in the overall volume of parts of machines and equipment (according to the products list) at from 20 to 60 percent. If one were to name any OMP item that has been developed and produced strictly in keeping with modern requirements of specialization and standardization, it would be antifriction bearings (manufacturing branch -- Minavtoprom). Since the beginning of the 1930's, when the bearing industry was created, specialization in the development and manufacture of antifriction bearings has always been at the level of requirements of the time and technical and economic expediency. Thus an analog worthy of emulation really does exist, both in the scientific-technical and in the organizational-methodological respects.

One should say that a certain amount of positive experience in narrow specialization in OMP items on the branch scale and their unification has been accumulated at enterprises of the Minavtoprom, Minaviaprom, Mintyazhmash, Minstroydormash, Minstankoprom and several other ministries.

The authors of the present article have at various times dealt for lengthy periods with questions of unification of items in the sphere of production and operation of gas turbine engines, and road and earth moving machines, including OMP items. Research has shown the high effectiveness and flexibility of the organization of production through readjustment of unified fittings, stamped pieces and other means of production, and unification and standardization of parts and structures of machines as well as their manufacture in specialized sections.

Thus the limited list of unified parts which are allowed to be used in newly developed and modernized items produced by enterprises of the Minstroydormash, Mintyazhmash and several other branches of industry for utilization by one client has made it possible to essentially reduce in these branches the list of hydraulic devices, fasteners, antifriction bearings, steel cable, transmission chains, cogged connectors, bolt and key items, and other items. The reduction of the list of OMP items had an essential influence on their reliability in operation and especially on the organization of repair.

/At the same time, it is remarkable that with respect to many OMP items, not only industrial enterprises, but also scientific and design organizations are not devoting the proper attention to work for unification and standardization, without which specialization and concentration of production are impossible./ The proportion of this kind of work has decreased in recent years, while the appearance of new problems such as the creation and introduction of industrial robots, automated control systems and others require that this work be expanded in all ways.

/Factors impeding unification and standardization are departmental barriers / and the continuing tendency to develop "natural businesses" not just within the framework of individual ministries, but within the framework of the VPO's [All-Union Industrial Associations], enterprises or production associations.

/The existing system of incentives for the development and introduction of new technical equipment has an extremely negative influence on the development of unification./ In keeping with it, an item with parameters which are clearly not as good, but which was created from original parts on the basis of an original design and configuration decision is rated more highly than an item based on standard and unified parts which have been assimilated in production.

We have not yet arranged the interbranch information and research center for unified parts of items, and when trying to borrow and utilize series-produced parts even for general machine building use, one sometimes encounters insurmountable departmental obstacles.

At the present time one can see a paradox. OMP items which by their nature have broad interbranch application, if they are produced by interbranch enterprises at all, are produced only in the interests of plants of 2-3 ministries, and then they do not fully satisfy their needs.

Reduction gears manufactured by enterprises of the Minstankoprom satisfy the national economy's need for them by no more than 60 percent, and this is mainly for enterprises of their own branch and of the Mintyazhmash and the Minstroydormash.

Fastening items manufactured by enterprises of the Minchermet are used by far from all machine building branches, and are mainly for fastening external, nonessential parts. The situation is similar with respect to the use of chains, hydraulic and pneumatic equipment, and so forth.

Scientific research and experimental design work in the area of hydraulic drives and hydropneumatic automated equipment are conducted separately by more than 40 branch and scientific research institutes, plant GSKTB's [State Special Design and Technological Bureaus] and KB's [Design Bureaus], and 25 higher educational institutions in the country, and without the proper coordination. The Minstankoprom is responsible for the development of standards for hydraulic drives. But a large number of standards are prepared here without coordination with the head planning organizations of the ministries or without taking their remarks into account. This not only does not facilitate the work, but also creates additional difficulties. There is

also lack of a system for the development of standards which contain contradictory requirements for various kinds of hydraulic equipment with similar purposes.

Items which, in terms of their parameters and quality characteristics, actually satisfy the requirements of the majority of machine building branches can be regarded as items for general machine building use. Therefore the procedure for the development and coordination of designs and quality characteristics of these items should be analogous to the development of general technical standards, that is, the manufacturers should coordinate them beforehand with all of the involved branches, and change and improve them during the process of this coordination. Then it will be as though the items are the result of the collective creativity of the future consumers. Experience in coordinating the designs of items for interbranch application was accumulated during the development of the corresponding recommendations of the ISO (International Organization for Standardization).

/In order to raise the level of unification, it is necessary to utilize extensively the block-module principle for the development and production of items,/ the creation of standard designs, the development of limited lists (but which take branch specifics into account) on the basis of standardized parts, and the construction of optimal parametric and size series. It would also be expedient to adopt interbranch technological processes which have been tested in production.

The organizational forms for producing OMP products should be different. Only when they are the main products of the enterprises, only then will it be possible to raise the level of unification and standardization and, on the basis of this, specialization. It might be effective to follow the recommendations of G. Kh. Popov <sup>1</sup> to take interbranch problems beyond the framework of the competence of one ministry. He suggests placing the responsibility for the development, production and delivery of items for interbranch use on a single machine building agency which is above the ministry, which, in his opinion, should be created as a "base branch of industry for solving all interbranch problems of the machine building complex."

But implementing the suggestions listed above will require a certain amount of time for their study, development and introduction. Therefore it is very important in this stage to apply the target-program approach to solving the problems. At the present time industrial ministries, with the Minstankoprom playing the leading role, have developed and the Gosstandart has approved comprehensive programs for standardization of fastening items, reduction gears, engine reduction gears, regulators and drive couplings for general machine building use, for hydraulic drives and pneumatic drives, for lubrication equipment, and so forth.

The decree of the CPSU Central Committee and the USSR Council of Ministers, "On Measures for Accelerating Scientific and Technical Progress in the National Economy," instructed the USSR Gosplan, the USSR Gossnab, the State Committee for Science and Technology and the Gosstandart to develop the main directions for further expansion and deepening of interbranch specialization

and cooperation in production in machine building during 1986-1990 and the period up to the year 2000 on the basis of maximum unification of components and parts.

According to preliminary calculations, during this period there is the possibility of raising the level of unification of groups of the same kinds of products to 80-90 percent and considerably raising the level of unification and standardization of items for general machine building use, which will contribute essentially to the successful solution of scientific and technical problems of an interbranch nature.

#### FOOTNOTE

1. See KOMMUNIST, 1982, No 18.

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## ROUND TABLE DEVOTED TO GENERAL MACHINE BUILDING PRODUCTS

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 65-88

[Round table discussion conducted by Academician A. G. Aganbegyan, EKO editor-in-chief: "At the Juncture of Branches"]

[Text] A round table discussion of problems related to the development of products for general machine building use was held in Nikolayev, where the association for lubrication equipment and filtering devices is located. It is one of the largest and the leading interbranch production line in the system. Participating in the meeting were manufacturers and consumers of products for general machine building use, scientists, representatives of territorial management agencies and organizations that are engaged in interbranch planning and coordination of the activity of interbranch production lines, and workers of material and technical supply agencies. The discussion was led by the magazine's editor-in-chief, Academician A. G. Aganbegyan.

Let us introduce the participants in the discussion:

A. A. Akmanov, director of the experimental plant for technological fittings, Nikolayev;

L. N. Bronnikov, director of the GiproNIImash, Moscow;

V. P. Goremykin, sector chief of the Central Economics Scientific Research Institute of the RSFSR Gosplan, Moscow;

G. A. Dzhavadov, professor, doctor of economic sciences, VNIIOrgtekhnika, Moscow;

V. Ya. Yemel'yanenko, deputy chief of the territorial administration of the USSR Gossnab, Odessa;

V. I. Zhidkov, head designer of the Sibelektroterm SKB [Special Design Bureau], Novosibirsk;

V. P. Kamyshchenko, chief of Soyuzglavobshchemash of the USSR Gosnab, Moscow;

L. A. Konorov, division chief of VNIINMash of the USSR Gosstandart, Moscow;

O. G. Korolev, deputy chief of the division of industry of the Odessa Obkom of the Communist Party of the Ukraine, Odessa;

I. P. Lebedev, chief of the administration of interbranch cooperative deliveries of the USSR Gosnab, Moscow;

A. M. Markov, division chief of the SKB [Special Design Bureau] of the machine tool building association, Ivanovo;

A. Ya. Oksenenko, director of the VNIIgidroprivod institute, Kharkov;

V. Ya. Semenov, general director of the PO [Production Association] for lubrication equipment, Nikolayev;

I. P. Semikras, chief of the Soyuzgidravlika VPO [All-Union Production Association] of the USSR Minstankoprom, Moscow;

N. V. Chanturiya, director of the Okean ship building plant, Nikolayev;

I. N. Shumov, senior scientific associate of the GiproNIIIMash, Moscow.

#### A Time to Take a Stand

A. G. Aganbegyan: -- At the July (1983) Plenum of the CPSU Central Committee they clearly expressed the idea that we are facing a qualitatively new stage in our economic development, when radical changes in the intensification of production are not only necessary, but also inevitable. The main source of intensification is acceleration of scientific and technical progress and the changeover to new technologies which are based on a new generation of machines and systems of machines.

Comparing the condition of machine building with the needs of the branches which utilize its products, we see that it is lagging behind. And, in the final analysis, many of the disproportions depend on machine building.

Why is ferrous metallurgy lagging behind? Let us take a look at its plants -- what kinds of blast furnaces, Marten furnaces and rolling mills do they have there? Many of them are of the first and second generations. And yet metallurgical equipment of the second and third generations has already made its appearance. What kinds of products does ferrous metallurgy produce? What are the profiles and thicknesses of the sheet steel and rolled steel? They do not meet many of today's requirements. And this is primarily because there is no specialized branch of machine building for ferrous metallurgy.

Similar shortcomings are inherent in other branches of machine building. Therefore if one is to speak of a radical acceleration of scientific and technical progress, as the task was posed at the 26th Party Congress and

formulated at subsequent plenums of the CPSU Central Committee, if one is to speak of a scientific and technical revolution (and a revolution is a qualitative replacement of technologies, the introduction of a new generation of equipment), then we must first of all turn our attention to the development of machine building.

One of the most important ways of raising its level and providing the national economy with the necessary equipment is to step up specialization and cooperation. If a machine building plant is doing everything for itself, if it is universal -- what is called universally self-sufficient -- then it is quite obvious that it will not achieve a high level of labor productivity, no matter how good its technology and production organization may be.

It is clear that the creation of universally self-sufficient plants, "natural businesses," which do everything for themselves, leads to reduced production efficiency. Moreover, when one is worried about everything, it is difficult to achieve high quality in each product.

The ideology of technical progress involves the following: raising the level of machine building through specialization, renovating plants and constructing new ones, and changing over to the production of recent generations of technical equipment -- not individual machines, but technical systems which would be based on advanced technology. On the basis of this advancement, all other branches should be technically re-equipped. Then we shall greet the new millennium with a material and technical base which is worthy of a society of developed socialism.

We have met with you in order to consider one of the crucial problems of machine building -- the problem of interbranch productions. It is certainly not new. In the decisions of party congresses, a great deal of attention is devoted to problems of specialization and cooperation in machine building and the development of specialized production of products for general machine building use. There have been a number of directive documents regarding this, including the decree of the USSR Council of Ministers of 1977. Certain positive changes have been made during the past 6 years, but we have not yet been able to satisfy the requirements of the national economy. We are asking participants in the discussion to discuss what needs to be done in order to provide for a qualitative leap in the development of interbranch productions.

I. N. Shumov: -- I have been dealing with interbranch production lines for 26 years. For a fairly long time I headed the Gosplan subdivision which was in charge of their development. They say that anything new originates in a battle with the old. But has this battle not been drawn out long enough? To be frank, my opinion is this: the movement in the area of interbranch production is going not forward, but backward. Why is it necessary to convince anybody that specialized production lines are more efficient and economically more advantageous? As though every competent specialist did not know that the first indicator of specialized production is its mass or large-series nature, with all of the ensuing organizational-technical and economic advantages. But, as we can see, the forces of inertia and conservatism are so much alive that it is impossible to crush the existing tendency for enterprises and branches to do everything for themselves.

Under the conditions of the branch system of management, I can envision only one organizational form of interbranch production -- the creation of an independent branch for products for general machine building use. Their organizational status is quite diffused now, and this makes planning and management difficult.

They used to say that there was no technical base for creating a branch for producing products for general machine building use. It was assumed that it could not be created for some period of time: old plants would be renovated and re-equipped and new ones would be constructed, and all of these enterprises taken together would make it possible to form a new branch. There are many reasons why we have not managed to do this yet. First of all because one can hardly consider it correct to attempt to create a new branch within the framework of the Minstankoprom, to which interbranch productions have been entrusted. For these are not its main products, the ones included in its profile.

Where does one begin the organization of such a branch? It seems to me that it is necessary to take advantage of ideas from scientific economics and define what is meant by products for general machine building use. It will be difficult to regulate planning without a precise understanding of this.

There are two directions for development of the production of OMP [general machine building use] products. The first is the creation of prepared batching items (hydraulic drives, mechanical and pneumatic drives, regulators, chains, and so forth). The second direction is semi-finished pieces: cast, forged and welded. Incidentally, we have been marking time for many years when it comes to the list of OMP products -- from 16 to 20 kinds. And during the days of the sovnarkhozes, when interbranch productions began to develop, there were almost 40.

As a temporary measure, a decision was made in 1977 to distribute the manufacture of OMP products among the various branches. What does the national economy gain from this, or, rather, what does it fail to gain? There is no possibility of providing the enterprises with the necessary items because the manufacturing branch makes everything for itself first -- it develops mainly the designs and list of items which it needs. There is no doubt that this impedes specialization and the creation of large-series production of OMP products, and it also worsens their operation because difficulties arise with spare parts and repair.

At one time the deputy chairman of the RSFSR Gosplan, Comrade V. N. Lisitsyn, and a group of specialists traveled through several countries learning about their solutions to problems of specialization and cooperation. Upon their return, they prepared a report in which they wrote that we were at least 5-10 years behind in questions of specialization and that about one-third of the increase in output could be provided as a result of production specialization, with the creation of a branch for OMP products.

But today there are fewer and fewer people who are enthusiastic about specialization. Of course conferences and job correspondence are also important, but they do not lead to success. Many people have defended dissertations on problems of interbranch production lines. They say that there is even a dissertation being prepared on planning of the unformed branch for OMP products. I should like it very much if this person would wait with his dissertation until such a branch is formed. The time has come for efficient organizational decisions. It is time to take a stand!

V. P. Goremykin: -- So far, according to our calculations, interbranch production lines satisfy 10 percent of the need for various kinds of products, and 90 percent of the OMP items are manufactured by the consumer branches themselves. Moreover, the range of products produced by interbranch production lines is extremely narrow. One must say that in world practice they include a number of instruments, electric engines, and so forth.

People speak of what they have in common technologically as an indicator of OMP products. For us, this pertains mainly to cast metal. The manufacture of forged pieces, welded units and parts of machines is quite insignificant in terms of quantity, and even fewer products are manufactured from metal powders. There are no enterprises that specialize in such costly and complicated technological processes as galvanic coating, which is costly and disadvantageous for each enterprise to develop.

V. P. Kamyshchenko: -- I should like to say a few words about one of the 20 main kinds of OMP products -- conveyor chains. As of today only two machine building enterprises fill orders under cooperation -- the Krasnoyarsk of the Minsel'khozmash and the Barnaul' of the Minneftekhimmash. Plants of other ministries will go to any lengths to avoid delivering conveyor chains on orders from the Gossnab. There are no apparent prospects for the development of these chains, although the need for them is increasing.

V. P. Goremykin: -- The production of equipment for lifting and transportation operations, the manufacture of nonstandard equipment, repair and operations service and so forth should also be of an interbranch nature.

I do not think that the creation of a ministry of products for general machine building use is a panacea for all of our problems. There can be interbranch productions at the juncture of the interests of territories and branches. Of course if the ministry that joins them together is under union republic jurisdiction, it might be possible to move closer to the goal. Local planning agencies will be able to exert an influence on the development of interbranch productions, taking into account the requirements of the regions. But now the Minstankoprom mainly uses enterprises of interbranch productions for satisfying its own needs.

V. Ya. Yemel'yanenko: -- For example the Minstankoprom has interbranch production of hydraulic equipment. But try to get it for plants of other branches! You will not be able to! They make everything primarily for themselves.

I. P. Semikras: -- Our Soyuzgidravlika VPO of the Minstankoprom produces hydraulic and pneumatic equipment. This equipment is also manufactured by Soyuzgidroagregat in the Mintraktorosel'khozmash, and Soyuzgidromash in the Minstroydormash. There are enterprises specializing in hydraulic equipment in the Minavtoprom, the Mintyazhmarsh and several other branches. Our VPO and Soyuzgidroagregat of the Mintraktorosel'khozmash produce approximately the same quantities of equipment.

We should determine the products list, and then the production of all items according to particular types and sizes should be assigned and distributed among the branches so that we do not repeat ourselves either in scientific research and design developments, or in new technical equipment and series production. All consumer branches must be informed of the type sizes so they will know what they can use, and so that they do not issue assignments for the "development" of bicycles, which were invented long ago.

After the types and sizes have been precisely established, the main thing will be to straighten out the consumption balances. The figures are all contradictory now. The demand by the year 2000 is given at various levels. If we are clearly aware of what we need to do and if we establish our position with respect to type sizes and demand, we shall be able to decide how to develop existing enterprises in terms of capacities, how to conduct renovation and technical re-equipment, and how to construct new plants. Then the prospects up to the year 2000 will be clear.

But today about 40 scientific research institutes of various branches are dealing with hydropneumatic equipment. There are duplications in research, development and products.

G. A. Dzhavadov: -- Yes, the development of organizational ties and the collectivization of production are indeed an extremely significant problem. The science of management is lagging behind the demands for the development of public production. This was discussed at the June (1983) Plenum of the CPSU Central Committee. The problem of organizational ties is especially crucial for interbranch production lines. There are several variants of their development. One of them was suggested at one time by the deputy chairman of the RSFSR Gosplan, Comrade V. N. Lisitsyn. But that variant did not work. Why? The problem of transferring enterprises from ministry to ministry had not been solved. Although in general, if a special branch of machine building can be separated out for animal husbandry and feed production, it is even more necessary to create a branch for products for general machine building use. The variant is radical, but it is hardly realistic to carry it out. It seems to me that it is more realistic to create interdepartmental, interbranch associations. We are working on this variant with the Nikolayev production association for lubrication equipment.

V. P. Kamyshchenko: -- The Izhevsk plant for reduction gears produces products for thousands of consumer enterprises. With whom and how should it cooperate?

G. A. Dzhavadov: -- We are speaking about cooperation among enterprises of various branches which produce similar products. Cooperation is carried out in order to deepen specialization. We assume that one plant will make small

reduction gears, while another will make large ones, and so forth. These enterprises would be under dual jurisdiction -- of their own branch, which would finance them, and the interbranch association.

The creation of interbranch production associations seems to me to be the most realistic path. If we manage to organize them, they will be able to satisfy public needs and restore confidence in interbranch productions. And after this, it will be possible to form a branch for producing products for general machine building use.

V. Ya. Semenov: -- We have begun such an experiment in creating interbranch production associations for OMP products on the basis of an agreement with the Stavrov plant of the Minavtoprom. First the managers agreed among themselves and signed the papers, and then they went to their own all-union production associations and obtained their consent. The advantage from working on a cooperative basis is obvious. For each of the parties receives the opportunity to concentrate production on the output of a particular kind of product. True, at first the ministries did not support us, but then they came to agree with our conclusions.

V. P. Goremykin: -- There are industries that produce OMP products which have union or zonal specialization, and there are those which should have a clearly expressed territorial nature, for example, the manufacture of semi-finished cast, forged and stamped pieces. The economically expedient radius for shipping them is 300-400 kilometers. Here one can apply the principle of specialization and cooperation which was suggested by Viktor Yakovlevich Semenov. The Central Economics Scientific Research Institute of the RSFSR Gosplan, in conjunction with other institutes and territorial agencies of the administration, is drawing up a program for the development and specialization of production of OMP products in the republic. Thus the program for Bashkiriya, which was created in conjunction with the Ufa Aviation Institute, embraces more than 60 machine building enterprises which are located on the territory of this autonomous republic and envisions several stages in the development of cooperation and specialization in the production of OMP products. The first stage is to conduct work for specialization of enterprises in the output of the same kinds of OMP products and requires practically no capital investments. The second stage involves deeper specialization, for which it will be necessary to reconstruct the shops and fit them out with technical equipment.

This path is not the only one. In the sister countries, and particularly in the GDR, there is a developed network of production lines which satisfy the needs of machine building enterprises for machine building services and products. In the GDR they exist in each district. We have decided to take advantage of this experience and are suggesting that a mechanization center be created in Rostov Oblast, which would provide means of mechanization for non-machine building enterprises located here and would produce for them a series of items for general machine building use. The suggestion met with a favorable response. The enterprise is being selected and provisions for its functioning are being coordinated.

V. P. Kamyshchenko: -- All OMP products are concentrated in the European part of the country. Yet a colossal industry is developing beyond the Urals, including machine building. There are neither specialized hydraulic equipment plants there (the enterprise that is farthest east is in Omsk) nor foundries. It is clear that the industrial centers of Siberia should have their own OMP products. In the Transcaucasian region the only plant for hydraulic equipment is in Yerevan, and the situation is no better in Central Asia.

I do not think that we are even taking advantage of those conditions for the development of interbranch production which exist in the Minstankoprom. And the ministry itself is primarily to blame for this. OMP products are far down on its list of priorities. Until a specialized branch is created in which these problems are the main ones, we shall not be able to advance in the production of OMP products.

L. I. Bronnikov: -- At one time, we were assigned the task of preparing a document which would substantiate the need for creating a branch for the production of OMP products. Such a document was developed by the Minstankoprom, and the central press wrote about its positive qualities.

EKO: -- During which years did this happen?

L. N. Bronnikov: -- In 1971-1973. It turned out, however, that the program was created while the material resources and capital investments were not transferred to the same parties. And the program was not fulfilled. The construction of new plants was drawn out. During this time, the situation actually did change in some regions of the country. It is necessary to review the decisions that were made previously concerning the creation of capacities, and to reject some of them.

Under today's conditions, from our point of view, two variants are possible for the development of interbranch production lines.

The first is to insist on the maximum development of them and to demand the funds necessary for this; the second is to make the opposite decision: to figure out how to use the capital investments that have been allotted most efficiently in order to obtain the maximum return. In this case, it is necessary to sharply reduce the list of products of interbranch production. The suggestion seems paradoxical. But today many machine building enterprises no longer believe in obtaining OMP products from interbranch industries. If by concentrating capital investments on developing the production of items of a decisive list we could supply them to the clients, then we would be working to promote interbranch production. Then it would be possible to move from particular decisions to more general ones. It seems to me that the lack of priorities, which are very necessary in this stage of the development of interbranch production lines, is a serious impediment.

Today this industry is not a unified whole. There are individual kinds of separate production, which have not been completely arranged and do not make it possible to draw a conclusion from their development. Take the Pskov plant for cogged wheels. What can be said about its activity? So far, nothing. The capacities have not even been fully introduced yet, and the plant is not

able provide its products for reduction gear construction, for which it was intended. So is it not time to draw conclusions? There is one "center" one Tsentrslit. They have the following situation: the capacity is created, but it is not possible to load them optimally since the system providing them with metal has not been worked out.

Still it is necessary to deal with those contradictions between territorial and branch interests which have been discussed here. A common denominator would be the creation of a ministry for interbranch industries which would coordinate the territorial and branch cross sections.

#### The Main Thing -- Reliable Cooperation

O. G. Korolev: -- The example of the Odessa Tsentrslit shows that the very fact of the existence of specialized productions is still not sufficient to satisfy needs of the national economy for products for general machine building use. When this plant was conceived, it was intended to completely eliminate shops with primitive foundries in Odessa, to solve ecological problems and to improve working conditions in smelting production. Today there are 42 foundries in our city. Not even the smallest foundry, including in the Minstankoprom, has been eliminated. As before, there are large quantities of the same kinds of products being shipped in opposite directions.

What solution can be recommended? I shall not begin to speak of the long-range future, but I think that the first stage could be improvement of cooperation, expansion of the legal capabilities of territorial Gosnab agencies and improvement of their activity.

I. P. Lebedev: -- On the organizational plane, the USSR Gosnab has apparently done more than others to implement the 1977 decree. Along with control of cooperative deliveries, the specialized cost accounting [khozraschet] Soyuzglavobshchemash association was created. So now the administration for cooperative deliveries deals with providing the national economy with cast metal, forged pieces made from ingots and rolled metal, stamped pieces, plastic and welded items, and ceramic metal. Soyuzglavobshchemash handles prepared components and parts: high pressure cylinders, crankshafts, pistons, reduction gears, hydraulic and pneumatic equipment, chains, and so forth.

The Gosnab is now working on improving cooperative deliveries and ties. Part of the planning is being carried out with the help of computer equipment. Software is being developed for completely changing delivery planning over to computers and for determining the optimal distance of shipments of cargo by one kind of transportation or another. We intend to make 95 percent of the deliveries through direct long-term ties.

It is another matter that the ministries are not striving for interbranch cooperation, or for intrabranch either, that is, they do not wish to go beyond the framework of the all-union production associations. The reason for this is the poor delivery discipline. It impedes the development of normal cooperative ties. We are trying to improve them by influencing the ministries. But so far we do not have a sufficiently effective instrument in our hands, except for the system of sanctions.

A. A. Akmanov: -- During the time of the sovnarkhozes, we obtained good cast pieces from the neighboring enterprise which was located only 4 kilometers from Nikolayev. Then branch cooperation began, and for 16 years there was not a single month in which we were given everything we ordered. We were assigned to a supplier from Ryazan. Now we ship cast metal over hundreds of kilometers, and we receive it intermittently.

I. P. Lebedev: -- Yes, this is true: the situation with respect to procurements is not improving. The actual production of cast iron is remaining at the 1977 level, even though the decree envisioned a considerable increase in it. The same thing is true of cast steel. One must say that the main ministry for OMP products, the Minstankoprom, which combines 10 central foundries, is not standing out from the others. The fulfillment of planning assignments for the startup of new capacities at foundries here is remaining at the level of 60-65 percent, and the fulfillment of orders through cooperation is no higher than the level of other ministries.

We are bothered by the lack of responsibility of certain suppliers. Even when you have reached an agreement, signed, sealed and delivered, it takes no less than two years before the products begin to arrive regularly. If for some reason it is necessary to change cooperative ties, we must duplicate them since there is the danger that the customer will be without semi-finished pieces.

V. I. Zhidkov: -- Incidentally, recently the suppliers have very frequently been slow in replacing series produced items with new ones which, for the most part, really are better. But for some reason they remove the old batching items from production before the new products are assimilated. As a result there are breakdowns in cooperation. The designers have to deliberately make inferior products, for example, installing a chain of two or three reduction gears instead of one new one which is not being manufactured yet.

It is necessary to straighten out this process in some way, that is, to remove outdated batching items from production only when the production of the new items has been arranged in the same amounts.

I. P. Lebedev: -- The main task is to raise the level of state discipline for deliveries. We are placing great hopes in the implementation of the decree adopted in April 1983 by the CPSU Central Committee and the USSR Council of Ministers concerning increasing responsibility for the fulfillment of deliveries under agreements. Thus during the first half of 1983 the shortages of deliveries of cast metal were cut in half.

V. P.[sic] Yemel'yanenko: -- Somehow we still manage to keep up deliveries within the ministry, but when it is necessary to fill orders for supplies for enterprises of the region which belong to other branches, all kinds of excuses begin to appear: either there are not enough capacities or there are not enough materials ... This situation arose, for example, when we were supposed to deliver plastic items. But the situation is exactly the same for cast, forged or stamped pieces. The customer comes as a supplicant to the plant to which he is assigned. And the supplier places all kinds of demands on him: do

this, help with this, pay this much, accept the order in this form. Suppliers of semi-finished pieces keep tabs in tons and therefore they try to turn over as much tonnage as possible. They make the pieces heavier, and more shavings are left on the stands where they are finished ...

If a specialized enterprise which produces reduction gears, cast metal or hydraulic equipment does not fulfill the delivery agreements, one cannot place much hope in this cooperation, and some plant will be forced to manufacture its own batching items, that is, become universally self-sufficient.

Supply agencies, of course, hold the suppliers to their commitments to the extent of their legal rights and capabilities. We force them to pay fines. Indeed, negligent suppliers sometimes pay large amounts of money. But what is the point? They pay out of the state pocket and not out of their own.

Cooperation should be reliable. Achieving this requires a standard agreement for cooperative deliveries, which would clearly regulate the rights and responsibilities of both the manufacturer and the consumer.

EKO: -- How, in your opinion, in which indicators is it best to plan and take procurements into account so as to avoid overexpenditure of metal?

V. Ya. Yemel'yanenko: -- There is perhaps no other measure than the ton. But one can insist that the suppliers give progressive technological tolerances for the processing of parts if one stipulates the coefficient of the utilization of metal. I think that it should be 0.8. If the suppliers produce blanks with a coefficient of 0.9 they should be paid an increment to the list price. And if the coefficient of utilization of metal falls to 0.6-0.7 they should give a rebate.

Now even plants which manufacture cast pieces for themselves are not very interested in developing progressive technologies, since they keep track of cast metal in tons. Take, for example, the Odessa Pressmash plant. Out of 8,132 tons of iron it melts more than 7,000 tons in earthen molds -- as we say, in the "dirt." And since the metal melts into the "dirt," large tolerances for processing are inevitable.

I can say that not a single ministry of the enterprises of our region has envisioned designing its foundries taking progressive technologies into account. And this is not an empty statement. I am speaking on the basis of plans for capital construction for 1984 and orders for batching items.

EKO: -- We have present at our meeting managers and leading specialists of well-known machine building plants. How do they, the immediate consumers of the products for general machine building use, evaluate the level of cooperation and development of interbranch production?

N. V. Chanturiya: -- It seems to me that it is necessary to deepen specialization of production of OMP products and improve production ties for cooperation. To do this, we should once again review what production should be specialized at the level of the branch and what production should be specialized at the interbranch level.

At the present time, ship builders have to develop their own machine building in order to outfit the ships with all kinds of mechanisms, transmissions, a reduction gears, which each plant does for itself, sometimes primitive, with a great deal of material-intensiveness and labor expenditures. Moreover, it is still necessary to help the enterprises of the region.

Nine out of every ten telephone calls to the plant director have to do with some request -- either for materials or for equipment. Ship building is the leading branch in Nikolayev. It is accepted that ship builders are supposed to help everybody. Territorial management agencies also make their decisions incumbent on us. But how can we help? With what funds? Materials, wages and everything else is assigned to the plant. It is not good not to fulfill the assignments of local agencies, but if they are fulfilled it is to the detriment of the basic program. For every ruble of output the plant loses 5-6 rubles' worth of its products on the side. When we turn to our own ministry and request even material resources for these additional assignments of the territorial agencies, we are refused.

In order for the director of the enterprise not to be placed in the position of a marionette who bows in all directions, it is necessary to find a form of combination of branch and territorial interests. First of all this means, of course, a state plan. And if a need arises for territorial cooperation, the assignment should be backed up by resources, especially for rendering patronage assistance to agriculture.

V. I. Zhidkov: -- The Sibelektroterm production association manufactures large electrothermal equipment for various branches of the country's national economy. These are mainly unique items produced individually or in small series. Their output is controlled and approved by the USSR Council of Ministers, Gosplan and State Committee for Science and Technology.

It would seem that there should be no problems with cooperation and batching for creating the kind of equipment which determines the development of many branches. But, on the contrary, we have difficulties with material and technical supply for production in all stages, from planning to introduction.

Take filters. Today during an excursion to a plant for lubrication systems I saw excellent filtering devices. But we are given such miserly quantities of them that we can use them only on equipment that is produced for export. We are forced to give our own customers incomplete installations, without filters. This is a clear problem, but we still have not managed to develop the production of filters!

One could speak about the difficulties in obtaining spiral springs of the type used in cars for electric furnaces (the springs are used for the mechanism for pressing the electrodes) or about how many times we have played the role of poor beggars to the car plants of the Ministry of Railways.

One cannot remain silent about the hardware made of nonmagnetic steels which is required for electrical equipment with large working currents and which nobody wants to make (we have to manufacture them by placing an additional

load on our machine tools). But we have experienced special difficulties with hydraulic equipment although, as I came to understand here, its production is considered to be among the most developed among the OMP items. But we had to create a special section for hydraulic equipment and assimilate products which are not at all related to our electrothermal products. Metallurgists make many complaints about the liquids which are used in hydraulic equipment: they are not suitable for high temperatures which are found in the furnaces. There are also many complaints about the seals. We have been forced to make them from rubber, which does not withstand high pressure.

I. P. Semikras: -- I have been working in the area of hydraulic engineering for a quarter of a century now, and during all this time there has been the problem of rubber sleeves, hoses and sealing for hydraulic systems. Neither the Minneftekhimprom nor the Minkhimprom is resolving it. Our sealing materials are neither reliable nor durable, and they last an average of one-fifth to one-eighth the amount of time that the best world models do. The problem of sealing for hydraulic equipment is also being solved in other parts of the world by creating plastics with new properties, fluoroplastics. They have been used a great deal in Japan and West Germany.

Those principally new technological and technical systems, without which, as was pointed out at the June (1983) Plenum of the CPSU Central Committee, it is impossible to sharply increase labor productivity, require hydraulic equipment of the very highest class.

On the basis of this, one can determine the main directions for its development: integration of hydraulic and pneumatic equipment with electronic equipment, which provides for the achievement of a high level of automation of equipment and its increased productivity; greater reliability of the systems, which is especially necessary for the operation of flexible automated production lines and machine tool complexes and other technologies with a minimum utilization of labor expenditures; a change in the structure of the hydropneumatic equipment that is produced, with a sharp rise in the level of batching by associated batches.

A. M. Markov: -- Take hydraulic cylinders. Quite a few of them are being produced in the country. But nobody produces them for auxiliary operations or for transportation systems. And we have now begun to create flexible manufacturing systems (GPS) [FMS] and we are very much in need of these hydraulic cylinders.

Developed countries are already changing over to the production of the GPS, which operates according to the principle of waste-free technology. The question of using batching items of the highest technical level and reliability -- automated warehouses, robot trailers, electronic computers -- comes up nowhere so critically as it does when creating these. The presently existing principle of delivering batching items by the piece for the production of complicated products is generally intolerable. Supply and transport operations are increasing immensely, and production expenditures are also increasing. And the more complicated the product, the more important and expedient it is to obtain all the batching items from the same place.

It would be more advantageous to close several machine tool plants that are producing outdated products and change them over to the production of batching items of a high technical level. The Ministry of Machine Tool Building itself suffers primarily from a shortage of these.

V. Ya. Yemel'yanenko: -- In his statement, Ivan Pavlovich Semikras suggested establishing type sizes and assigning all the products to various plants for hydraulic equipment. But I am bothered by the fact that the enterprises could become monopolists in particular kinds of items. What would happen to scientific and technical progress then? Let us say that there are much better hydraulic cylinders in the Minstroydormash than in the Minstankoprom. And this is a motivating stimulus. It forces the related enterprises to progress. Therefore I am against rigid limitations on product lists. We must have reasonable specialization.

#### Science and Interbranch Production

EKO: -- What does science have to say about this, and how does it see the problems and prospects for development of hydraulic and pneumatic equipment?

A. Ya. Oksenenko: -- Our hydraulic equipment is still frequently distinguished by the fact that it leaks. Practically nobody is responsible for the quality of the sealing materials. Therefore the hydraulic equipment withstands a pressure of 100-150 atmospheres when it should be able to withstand 300. And in world practice there is equipment which will withstand 1,000 atmospheres.

Recently we have had occasion more and more frequently to encounter a situation in which the introduction of developments for hydropneumatic drives is slowing up significantly, as a result of which there is a slowing of the process of updating hydraulic and pneumatic devices. If one were to analyze why this is taking place, attention would be turned primarily to the fact that batching items are being updated slowly. And without them it is difficult to create anything. For example, the national economy needs pumps with reduced noise. Electronic devices and instruments are needed for them. But the supply ministry refuses to give them to us.

In order for new technology to advance in hydropneumatic equipment, it seems to me that type sizes are still needed. They should include developments not only of hydraulic equipment per se, but also of materials and batching items, beginning with filter paper and ending with electronics. If a ministry for interbranch productions were created, in one way or another it would facilitate solving the problems. But it would not completely do away with them. The problem of batching items and cooperation would remain. In our opinion, it is necessary to determine officially those responsible for the organization of production and for the technical level of batching items for hydropneumatic equipment.

For two five-year plans now there has been no coordinated plan for hydraulic and pneumatic equipment. Each time it is born and dies without ever having been even approved. In 1978, it died in the State Committee for Science and Technology. How can one direct such a complicated and multifaceted branch as the production of hydropneumatic equipment without a plan?

And yet hydraulic equipment, along with computers and electronics, is the basis for principally new technical and technological systems, the basis of the scientific and technical revolution. New spheres of application of hydraulic equipment are appearing, for example the extraction of minerals from the bottom of the sea. We are alarmed by the figures of consumption of hydraulic equipment for robot technology. They show that it is not necessary for the time being because it is frequently the simplest manipulators of the first generation that are being created.

Instead of developing scientific research and experimental design work, each time VNIIgidroprivod cuts the money and materials for our institute. Our experimental base is weak. Skilled personnel have been gathered together in the institute over many years. But time is passing and the people are growing old and going on pension. There arises the problem of how they are to hand down their experience to those who are to replace them if there are no laboratories or an experimental base.

L. N. Bronnikov: -- One must say that even today some attempt is being made at centralized influence on the technical and economic policy in the area of OMP products. Our institute has developed price lists for cast metal and stamped pieces, and the VNIIgidroprivod has developed them for hydropneumatic equipment.

We have made calculations of the optimal capacities of various kinds of interbranch industries. But all this is clearly not enough. We need a large volume of economic and scientific development. Yet the volumes of scientific research and experimental design work in the various institutes for interbranch industries is not increasing, but decreasing. It is very important, for example, to determine the policy in the area of cast metal. In Lipetsk they have created a special division of our institute -- the basis of the future Gidrotsentrolit. An excellent building has been built for 850 people. But today it is possible to maintain only half of this staff.

N. V. Chanturiya: -- Yes, this is true. There are many obstacles on the path to unification. Here is a simple example. Our plant now constructs ships from plans of Leningrad designers. So the new developments have nothing in common with the previous ones, even in terms of OMP parts and components. The Leningrad workers have not tried to take into account the general machine building items which are manufactured at our enterprise. Of course we are trying to regulate this and to influence the unfavorable situation which exists: we are giving the developers our standards, which are used at least for intraplant standardization and unification. But, as a rule, friction arises and there are no positive results.

L. A. Konorov: -- Experience in international standardization shows that OMP products are the basis for collective planning. In world practice it has turned out this way: blueprints developed by the clients are produced and all parameters of OMP items are coordinated, that is, one can clearly see a desire to produce products which would provide for a maximum effect and would be widely used. We have not managed to achieve this so far. As soon as the plan for an OMP items is submitted for a response, there is a lack of confidence:

suddenly you will have to make this product for yourself; suddenly the suitable materials will not be available, and so forth. And then begins the red tape for coordinating the standard.

It is necessary for the head scientific research and planning-design institutes of interbranch productions, along with the associations, to include in the plan for their developments concrete assignments for implementation of the Comprehensive Program for Standardization in the Area of Unification During 1981-1985 and the Period up to 1990.

A. G. Aganbegyan: -- And so let us sum up the results of our discussion. We should like to imagine the not-so-distant future of our machine building. The branch will be more powerful. Scientific-production and production associations will be competing to produce the best products. They have extensive rights and can enter into direct ties with one another.

A good deal has been said here about improving cooperative centralized deliveries. And this is an important condition for improving material and technical supply. But direct ties make it possible to come to better agreements and to formalize the responsibilities of both parties. In the national economy, a course has been taken toward increasing the independence and responsibility of enterprises and associations and toward expanding their rights. As you know, an economic experiment was conducted to this end beginning on 1 January 1984 in five ministries.

It would seem that in this situation there is no longer a need for the existence of a multitude of machine building ministries, whereby in principle it is impossible to solve interbranch problems since they are all separated by departmental barriers and have nothing in common with one another. And since when the independence of enterprises and associations is expanded, the center of gravity shifts to the lower levels of the organizational structure of the national economy, which are at the same time the main sources of the creation of material goods, it seems to me that it would be possible to create a unified machine building committee which would implement the policy of specialization.

A very important principle of specialization is being advanced by the Ivanovo machine tool builders -- the delivery of items in sets and all from the same source. Wholesale trade becomes very important under these conditions. It is very effective when there are direct ties between suppliers and consumers. It will help to eliminate shortages.

With direct ties, if you have made an agreement and you have not received your deliveries you are still obligated to make reimbursement for all of the damage, approximately as it is done in Bulgaria. There, if deliveries are not made under an agreement, the consumer makes out a bill for the sum of the damage and money is obtained from the supplier without question. The supplier can then complain to the arbitration board. The litigation can last for six months or even a year ... The supplier becomes convinced fairly quickly that it is disadvantageous to fail to fulfill contractual commitments. This system quickly eliminates delivery failures and contributes to establishing order.

Such is one aspect of the matter, which is related to the economic mechanism and makes it possible to find a radical solution to the problem. The second aspect, of course, is displaying a greater interest in machine building. Let us look at the proportions of capital investments in machine building as compared to other branches. Let us take just the production of implements of labor for all branches of the national economy. Only 5 percent of the capital investments are used for this. For capital repair work in ferrous metallurgy we spend 2 billion rubles a year, and for the development of metallurgical machine building -- only 100 million. All branches must take 4-5 percent of their capital investments and transfer them to machine building, to those areas on which scientific and technical progress depends.

Question: -- What are they?

A. G. Aganbegyan: -- The experimental base, for example. There is no experimental base, but there are volumes of research. It is necessary to give results and not reports. It would apparently be expedient to create intermediate scientific production associations which would have regulating subdivisions and would bring the new developments to the point of introduction. Of course, other important areas for investments are specialization, interbranch productions, and technical renovation.

For machine building, perhaps, there is even some point in introducing internal convertible currency as they have in Hungary. Let us say that I do not like the lubrication system and because of it I cannot start up some piece of costly equipment. I order to have it imported. It is quite natural that it is impossible within one country to reach the world level in all industries and with all kinds of products. It is necessary to take advantage of international cooperation.

In the statements, various opinions were expressed about the organizational form of the branch for producing products for general machine building use and about what products to include in this category. The organizational period has indeed been drawn out, with all the negative consequences that ensue. It would be expedient to accelerate the creation of an independent branch.

At the same time it is necessary to be clearly aware that organizing a special branch for producing OMP products alone will not solve the problem. It is impossible to include in one branch all the products for general machine building use which are needed by modern industries. Thus it was quite correctly stated that it is disadvantageous to develop galvanizing production at each enterprise. But then would it be expedient for all who use printed circuit boards, the "bread" of modern electronics, to create their own means of producing these? It is one thing when an enterprise is producing radio and television and computer equipment, for it has the possibility of creating large automated sections for printed circuit boards. It is another thing when the machine building plant needs a small quantity of these, only for certain kinds of products which it produces. The same thing can be said about parts made of metal powders. Therefore, in addition to special interbranch productions, cooperation should also develop among various branches and enterprises for various kinds of parts and technologies.

The suggestion concerning the creation of interbranch production associations on the basis of cooperation is worthy of attention. In our opinion, we should support the Nikolayev production association which, on its own initiative, has begun this work in the area of cooperation in the production of automated lubrication systems.

We should accelerate the creation of a comprehensive machine building program in which interbranch productions would be the most important part.

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## FACTORS IN DEVELOPMENT OF MACHINE BUILDING EXAMINED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 89-112

[Article by S. A. Kheyman, doctor of economic sciences, professor, Institute of Economics of the USSR Academy of Sciences (Moscow): "The Development of Machine Building: Organizational and Structural Factors"; passages enclosed in slantlines printed in boldface]

[Text] Domestic machine building has had great and generally recognized success. In the final analysis, our machine building has created all of the economic potential of the USSR -- fixed production capital, whose value has exceeded 1.3 trillion rubles, including equipment for the extraction of fuel in the amount of 2 billion tons of conventional fuel, for the production of 1.37 trillion kilowatt-hours of electric power and for the smelting of 148 million tons of steel, the most complicated space equipment, laser and electronic devices, and many hundreds of millions of units of modern household equipment in the families of Soviet people.

/The problem of further development of machine building should be regarded in light of those tasks which are facing a society of mature socialism and taking into account the contribution which the machine building complex can make to their solution./ These tasks were formulated in the decisions of the 26th CPSU Congress and subsequent Plenums of the CPSU Central Committee.

The main ones are: technical re-equipment of production, the implementation of investment programs and the creation of a powerful, technically perfected, advanced production apparatus (including an apparatus for machine building itself); a considerable increase in productivity and a consistent change in the nature and content of labor. And for the longer range: a solution to such basic socio-economic problems in communist construction as the transformation of agricultural labor into a form of industrial labor, and the formation of prerequisites for an organic combination of mental and physical labor in the production activity of people; provision for the development and growth of enterprises of subdivision II and improvement of public well-being; technical support for nonindustrial services and consumer services; creation of material conditions for increasing free time and the creative utilization of it, and, finally, providing for the country's defense -- machine building is justifiably assigned a leading role in solving all these radical problems.

The basis of the solution to all these problems is the /readiness/ of machine building to perceive and, in permissibly short periods of time and with optimal expenditures, to realize the possibilities of the scientific and technical revolution; the /ability/ to keep up with the dynamic changes in technical equipment and technology, in the technical level and in the rapidly changing assortment of technical equipment that is being manufactured, and the ability to update all elements of productive forces fairly quickly. This presupposes flexibility and mobility of its structure and organization.

One gets a special sense of how significant and pressing these problems are when developing the concept of a comprehensive program for the development of machine building over the next two decades, that is, when solving the problem of how our country's machine building will enter the 21st century.

It is quite obvious that there are two aspects of the program that is being drawn up for the development of machine building: /what products should be produced by machine building,/ that is, what are the main directions for improving the production apparatus of the national economy, including also technical equipment for the nonindustrial sphere, and the second aspect -- /what should machine building itself be like/ in terms of its technical level, its structure and its organization. In our opinion, there is a certain amount of distortion in the development of these aspects: an unjustifiably small amount of attention is devoted to tasks of improving the structure and organization of machine building, although it is our deep conviction that without a radical solution to them it will be impossible to solve all the main problems that are facing us.

The development of an efficient model for the development of machine building requires a comprehensive analysis of the problems related both to the development and improvement of the national economy and to machine building itself; an analysis of the resources which it has at its disposal -- both a quantitative and a qualitative description of them; and the group of problems which it has not yet solved with the existing situation.

/The production resources which USSR machine building has at its disposal/ are indeed immense. Concentrated in the machine building complex are 24 percent of the fixed production capital in industry. Machine building and metal processing enterprises employ 40.5 percent of all the workers and 53 percent of the engineering and technical personnel. Moreover, according to various calculations, there are about 5-6 million workers in mechanics shops and services of nonmachine building enterprises, where they are employed in the manufacture of components and parts for technical equipment, its repair, and so forth. Taking this contingent into account, machine building and machine servicing employ up to 57-60 percent of all the workers in industry.

The stock of metal processing equipment in USSR machine building and metal processing, in terms of the number of units, is appreciably greater than the stock of it in the United States. Moreover, in the USSR outside the areas of machine building and metal processing there is a stock of this equipment which exceeds (also in terms of the number of units) the stock of metal processing equipment in machine building and metal processing in the United States. On

the whole, the stock of metal processing equipment in the USSR essentially surpasses, in terms of the number of units, the stocks in the United States, Japan and the FRG taken together.

Of course the capacity and capabilities of machine building are determined not only and, perhaps, not even so much by the quantity of equipment, but primarily by its quality, structure and degree of utilization.

Yet certain branches of industrial machine building are developed extremely inadequately in the USSR, and they do not satisfy the needs of the corresponding branches of industry. This pertains to metallurgical machine building, and especially the production of modern rolling equipment, to chemical, transport-lifting, road-construction, forestry and pulp and paper machine building, to the production of instruments and means of electronic support for equipment, individual kinds of agricultural equipment, metal processing equipment, above all press and casting equipment, and so forth.

Overcoming these shortcomings is the most important task of our machine building.

#### Unsolved Problems

/One of the most important economic and social tasks facing machine building is to raise the level of mechanization and automation of production, and to achieve an absolute and a relative reduction of the number of people employed in manual labor./ The proportion of these in industry approaches half of the workers, and in construction -- somewhat more than half. There are large contingents of people employed in manual labor in trade and transportation. On the whole several tens of millions of workers are employed in manual labor. The demographic situation of the 1980's, the rising educational level and the demands of the younger generation attach special urgency to solving this problem.

A considerable proportion of the manual labor goes for processes of transporting and moving, both within the plant and in the process of realizing intrabranch and interbranch ties. One of the essential causes of the situation which exists (along with shortcomings in production organization) is the dispersion of the production of means of mechanization, and especially for lifting and transportation operations, the absence of a sufficiently large-scale specialized and organizationally formed production line for lifting and transportation equipment, especially nonrail floor equipment -- automatic loaders and electric cars, and means of continuous transportation -- transporters and conveyors, especially those with automated control.

Since assembly and disassembly equipment does not occupy a sufficient position in the output of USSR machine building, the performance of repair work considerably increases the number of workers employed in manual labor.

/The next important problem is the rate of updating of equipment./ Under the conditions of regular growth of the fleet of equipment, machine building is not providing for sufficient rates of replacement and updating of outdated and worn-out equipment.

In past years, equipment that has been removed because of obsolescence and wear and tear in USSR industry has amounted to 2.4-2.5 percent (in 1982 -- 2.2 percent) per year, including in machine building and metal processing themselves -- up to 2.0 and 1.8 percent per year. The indicators of updating equipment are even lower in such leading branches as the chemical and petrochemical -- 1.9 percent, ferrous metallurgy -- 1.4 percent, the pulp and paper industry -- 1.0 percent and electric energy -- 0.3 percent per year. The low rates of updating production apparatus, naturally, increase the volumes of work for capital repair, and also medium-term and current repair, of equipment, load the repair services of the enterprises, and increase to very significant amounts the stock of equipment and labor resources employed in these services.

All industrially developed countries are concerned about the problem of updating equipment. It is typical that the United States considers itself to be far behind Western Europe and Japan in this respect, and in the 1980's the country's administration introduced norms for accelerated amortization for updating the equipment -- 5 years for most of the industrial equipment. According to published statistics, in the United States processing industry the rate of updating of equipment was the highest in machine building, especially in transport machine building.

It should be kept in mind that under the conditions of high rates of technical progress, a country with a large production apparatus is not in a position to solve the problem of updating equipment just by replacing it with new equipment. In countries such as the USSR, the stock of available machines exceeds the volume of annual output of the corresponding technical equipment 25 to 30-fold and more. Consequently, it becomes especially crucial to modernize equipment. But in order for this to become real updating, the basis of it should be provided through the efforts of machine building itself. The producers of the equipment should include in it the possibility of modernization even when the technical equipment is being designed (create, as it were, a genetic prerequisite for modernization) so that it will be possible to replace the major working components while continuing to use the more metal-intensive base units. When producing the next, more productive models, plants should provide the necessary quantity of components for modernization of equipment they have manufactured which is already in operation.

The production and continuous supply to the consumers of a selection of replacement and repair components and parts which is sufficient for the operation, repair and modernization of technical equipment is an indispensable feature of modern high-quality machine building.

/Technical equipment for quality./ It is known that with the existing successes in the area of creating modern progressive technical equipment with high qualitative characteristics, a fairly large number of kinds of products from our machine building industry -- both means of production and objects of consumption -- do not correspond to the modern level of requirements on product quality. One of the main reasons for this is that there are certain shortcomings in the structure of machine building products and in the structure of the system of machines for producing many kinds of products.

Frequently there is a lack or an extremely poor representation of equipment which provides for high quality of the final product. This pertains to technical equipment for finishing products in rolling equipment; the quality of the rolling mills themselves, the equipment for plastic deformation of metal, technical equipment for strengthening, completing and finishing the product in the equipment from machine building itself; finishing equipment for the textile industry, and so forth.

Therefore one of the constituent parts of the program for the development of machine building should be providing a technical and technological basis for quality and overcoming arrears in the output of technical equipment to ensure quality.

/Imports and exports of technical equipment./ Under modern conditions, what with the gigantic diversity of technical equipment, even such immense machine building complexes as those which exist in the USSR and other developed countries cannot completely satisfy the needs of all branches of the economy for technical equipment. Consequently, a certain amount of international division of labor is justified. With respect to the USSR, it is reflected primarily in socialist integration and also in import-export ties with developing and developed countries.

The production capacities at the disposal of domestic machine building and the potential of our science provide a basis for the USSR to have a more limited list of imported machines (there is no justification whatsoever for importing many kinds of equipment) and a considerably larger volume of exported technical equipment.

It seems that the imports of large-cargo trucks, road construction equipment, machines for producing industrial chips for the pulp and paper industry, a number of kinds of chemical equipment, and other kinds of technical equipment that is not unique could easily be replaced by domestic equipment.

A factor of no small importance in increasing the imports of many kinds of technological equipment is the inadequate supply of certain industrial machine building branches with electronic systems, instruments and components. For all the main components of technical equipment that is produced could be manufactured at domestic plants, and only difficulties in obtaining electronic equipment force us to turn to imports.

Increasing the export capabilities of our machine building is very important not only economically, but also socio-politically, from the standpoint of the development of socialist integration.

A quite essential and so far unsolved problem of machine building is the inadequate output and limited assortment of technical equipment which is produced in order to supply the nonindustrial sphere -- housing and municipal services, domestic services, trade and public catering, education and public health (many extremely important kinds of medical equipment are imported), and also technical equipment for the recreation industry.

The figures presented above concerning the resources of our machine building and the volumes of problems it has not solved show that the model of the machine building complex which has now been formed, its structure and organization, do not guarantee that the results of machine building production will be adequate to those resources which this production has at its disposal.

This lack of correspondence has diverse manifestations and causes. Let us discuss them.

The first of the causes is the organization of the technical equipment production process itself and the structure of machine building production -- branch and intraplant -- which is conditioned by this.

The second is the existing interrelations between producers and consumers who use this technical equipment.

The third is the peculiarities of the products of domestic machine building which are related to the specific features of the organizational structure of all of USSR public production.

The historical conditions in which Soviet machine building developed have brought about the creation of complex plants with minimum cooperation, with their own procurement and instrument shops. The high rates of industrialization in the prewar years, the wartime conditions and the postwar restoration required priority development of production of basic technological equipment, and they correspondingly delayed the development of specialized production technical equipment for supplying auxiliary processes and also the creation of specialized enterprises for producing components and parts for branch and interbranch use and for producing instruments and technological fittings. As a result, the auxiliary equipment they absolutely needed, as well as a large range of semi-finished pieces, batching components and parts, and also a large list of instruments, and almost all the technological fitting were manufactured and are being manufactured by many large plants and some medium-sized ones for their own needs through their own forces, and they have considerably worse technical characteristics and significantly greater expenditures of live and embodied labor.

#### Specialization and Interbranch Productions

Let us move from an analysis of "what is" to a determination of "what should be" -- to what our machine building should be. To do this it is necessary to consider and somewhat enrich the concept of interbranch production lines. Traditionally they include procurement productions, the output of standards and fasteners and an extremely narrow range of functional components for technical equipment: hydraulic and pneumatic drives, and certain kinds of reduction gears.

/It is extremely crucial to develop and establish a scientifically substantiated list of items which should be regarded as products for general machine building purposes./ This is not abstract theorizing at all. Machine building enterprises, scientific research institutes and the ministries should know which elements of all kinds of technical equipment can be acquired ready-

made and how to obtain bearings at the particular time. In turn, this should place on the planning agencies and the branches the responsibility for organizing the production of these elements and components on a scale which satisfies the needs of machine building itself and of the branches in which its products are used during the period under consideration and in the future. This point should be a most important constituent part of the model of machine building which should be formed.

In light of this, it seems to us that /enterprises of a functional specialization which manufacture unified and normalized functional components and parts which are the same for several or even for many kinds of technical equipment should become an indispensable part of interbranch production./

For modern production in the age of the scientific and technical revolution it is typical to have a regularly increasing diversity of kinds of technical equipment, just as the models are updated and replaced at more and more rapid rates. Another tendency contributes to this: progressive specialization of technological equipment. Both of these tendencies are quite predictable and progressive, but at the same time they contain contradictory elements. The economies of even the most developed countries are not capable of always replacing equipment when the object of production changes. A third tendency (also predictable in and of itself) "comes to the rescue". Along with the increasing diversity of kinds of technical equipment, in all (with few exceptions) of these kinds there form certain "elementary particles" of a functional nature which, with certain modifications, become a part of this technical equipment. Along with the traditional list of OMP products, we are speaking about engines, electric drives, transmissions, support components, control and management systems, and so forth, about a broad group of instruments and technological fittings for metal processing. It should also be taken into account that modern automated equipment, particularly processing centers, require instruments and fittings of a considerably higher class.

Consistent development of the entire spectrum of interbranch production that has been described and systematic persistent growth of the corresponding capacities are critically necessary. Only with this kind of "infrastructure" will our machine building be able to efficiently produce the necessary technical equipment and to react flexibly to the changing demands of public production and to the possibilities of scientific and technical progress which are continuously being renewed.

Suggestions to create a ministry (committee) of interbranch production have been made (including by the author of these lines) many years ago, and they were brought up to extremely high levels. Nonetheless, the question was not resolved and the development of enterprises of interbranch production that had already been created did not proceed well at all, and the plans for this development were not completely fulfilled. This situation is closely related to the general condition of specialization in machine building and other branches, a process which is taking place slowly.

/The level both of object, and of technological and part specialization is inadequate./

The basic reasons for the slowing up of specialization are primarily organizational: there is the inadequate level of balance of the plans, which creates prerequisites for failure to fill plans for cooperative deliveries, and a no less important, and possibly more important reason is the lack of development of the mechanism for cooperation in the system of the entire economic mechanism. This unit should be singled out and developed both in the sense of stimuli and especially in the sense of sanctions, so that it will not serve as an impediment on the path to specialization.

An important role in increasing the effectiveness of modern machine building is played by the development of specialized production of parts and components for mass-produced technical equipment, for example, for the automotive industry, the aerospace industry, and so forth.

One can judge the tendencies in this area from data from the U. S. machine building industry. The proportion of enterprises with part specialization in all of the conventional net output of automotive construction amounted to 42.3 percent in 1972 and 50.7 percent in 1980. The share of these enterprises in capital investments in 1980 was 57.1 percent and in the number of workers it was 58 percent. According to data for 1980, the U. S. automotive industry had the following structure.

	Number of Workers, Thousands	In Percent
Automotive plants	303.5	32.9
Plants for part specialization	534.5	58.0
Plants for specialized semi-finished products	83.6	9.1
<b>TOTAL:</b>	<b>921.6</b>	<b>100.0</b>

What this structure produces is clear from the following. In 1980, the United States produced 8,067,000 motor vehicles, that is 27 per worker in automotive plants, and 8.8 per worker in all plants in the automotive industry.<sup>1</sup> The average capacity [moshchnost'] for passenger vehicles in the United States in 1980 considerably exceeded similar indicators for domestic passenger vehicles.

The development of enterprises with functional specialization becomes especially urgent because of our following a course toward the creation of a system of machines for comprehensive mechanization and automation of entire branches and productions. The network of functionally specialized enterprises and associations will make it possible to put together a considerable proportion of the systems of machines from ready-made functional components (according to the module principle).

/The basis of specialization, one of the most important prerequisites for progressive organization of machine building production and economical operation of equipment, is unification and normalization of technical equipment, components and parts, and typization of technological processes./ The 26th CPSU Congress especially emphasized the significance of this direction of the development of machine building: "To increase the effectiveness of machine building production as a result of improvement of its technology and organization, and to provide for in-depth intrabranch and interbranch unification of parts, components and technological processes."

Practice in this area is still far from realizing these directives. It is limited by departmental boundaries and extremely strong intrabranch barriers, and almost complete isolation and separation of large plants within the given branch or ministry. Thus the level of unification between the MTZ-50 and M-40 field tractors, which are related and close in terms of their basic parameters, is 2.7 percent. And this is within the framework of a single ministry! ZIL and GAZ, which produce trucks with fairly similar capacities, do not even want to know about interplant unification. In this connection, attention should be given to the fact that the majority of West European automotive firms import their universal [Cardan] shafts for passenger cars.

The situation with respect to unification is practically beyond the influence of the Gosstandart, although in terms of its economic significance, this complex of problems is comparable to the problems of standardization.

Extensive unification and normalization of components and parts for technical equipment (and also, to a certain degree, technological fittings) are a most necessary area of the progressive model of modern machine building. This work, under the supervision of Gosstandart agencies, should be organized immediately and sufficiently extensively.

/The orientation toward the consumer and machine service./ The existing branch specialization of machine building, the existence of certain monopolistic elements in the production of equipment, and, to a certain degree, the consumer's lack of an opportunity to select technical equipment create a tendency toward a certain separation between the producer and consumer. Producers of equipment study the peculiarities and specific features of the consumers far from sufficiently, and thus they sacrifice them for the sake of more series production. As a result, according to available data, the technical parameters of many machine tools and other kinds of technological and transport equipment essentially exceed the size specifications that have been developed for semi-finished pieces and parts that are processed on them as well as other work that is performed on them.

Technological parameters for equipment that are higher than those actually required lead to a corresponding increase in the sizes and weights of the technical equipment, to greater labor-intensiveness, metal-intensiveness and capital-intensiveness for their production, to increased loading of metallurgy and, as a consequence, to a direct increase in the cost of capital and, hence, to a reduction of the output-capital ratio for consumers of this equipment, that is, to a broader range of negative consequences for the national economy.

The party course toward intensification dictates the need to organize systematic accounting and planning of the utilization of the technical parameters of equipment. Planning agencies should play a large role in the organization of this work.

This situation is related to another large general economic problem. The production of the necessary range of equipment sizes, which enables the consumer to select equipment with the parameters he needs, should be accompanied by a sufficiently high level of quality of this equipment. If this does not exist, the consumer will select the most reliable machine tool, even if it is unnecessarily powerful. An example of this is the screw cutting lathe. The products of the Moscow Krasnyy proletariy machine tool plant have been proved to be good, which cannot be said about the products of other plants that produce machine tools that are similar but smaller. The ministries and also the local territorial agencies are trying to keep these plants "afloat" too, and not ruin the indicators of the ministry and the republic. As a result, an nonviable organism is artificially being kept alive instead of being faced with the need either to improve its work radically or to be eliminated in its present condition.

The orientation toward final results with respect to machine building, which was earmarked by the 25th CPSU Congress, means that its functions could not end with the production of technical equipment. Machine building is called upon to play a leading role in the investment process. This means a certain amount of responsibility on the part of machine building for effective functioning of technical equipment after it has been received by the consumer and ensurance not only of the possible, but also of the actual safe life of this equipment.

One can see that a gradual changeover has started everywhere to a system of guaranteed service and repair of technical equipment and the development of machine service. The producers of the technical equipment must develop not only the technical equipment itself, but also scientifically substantiated conditions for its operation, programs for machine tools with numerical program control when necessary, and also the principles, policy and technology of repair.

In our opinion, the safe life of technical equipment should be included in the guarantee parameters, of course, under the condition that the consumer observe the technical conditions for the utilization of the equipment. This will also serve as very valuable feedback and will contribute to improving the quality of the machines.

#### To a New Stage -- A Better and More Efficient Structure and Organization of Machine Building

From all that has been said it is obvious that there is an immediate need to develop a comprehensive long-term program for machine building and the branches associated with it (above all, ferrous metallurgy). Let us discuss some of the individual problems that arise with this.

/1. The structure of the technical equipment that is produced./ In addition to technological equipment, it should contain a complete set of auxiliary equipment (control, transport-moving, packaging and warehouse) for all branches of material production, and also complete sets of finishing equipment; components and parts for replacement and repair sufficient for the entire period of operation and for modernization of the technical equipment; and sets of technological fittings and instruments.

Accelerated development of the electrical equipment and especially the electronics branches of industry (with an essential improvement of product quality) is especially important. Priority should also be given to the development of instrument building, the production of means of automation, and electronic computer equipment -- computers, mini-computers and micro-processors.

It is necessary to organize both mass and series, as well as individual production of scientific, experimental and testing equipment. At the present time, there are practically no machine building plants or associations which would accept orders from enterprises and scientific research institutes for this kind of production. As a result, the consumers of the technical equipment themselves have to engage in this, developing the corresponding capacities for this purpose.

We should also develop the design and production of a broad range of machines and equipment for all branches of the sphere of services and modern kinds of technical equipment for personal use.

It is necessary to sharply limit surpluses of the parameters of the technical equipment that is created. The series of all kinds and models of technical equipment that is put into production should be determined taking into account the utilization of the capacity parameters of the means of labor, and financial sanctions should be applied for incomplete utilization of them, like the cosine "phi" in energy engineering.

/2. Design materials./ To create this technical equipment it is necessary to have a comprehensive program for reorientation both of the designs of machines and technology, and of the assortment of rolled metal that is produced and the assortment of all metal consumption -- from cast metal to high-grade rolled metal. There should be a corresponding reorientation of the production of metal processing equipment (acceleration of the output of pressing and stamping equipment) and products of metallurgical machine building, especially rolling equipment, which is not ready for extensive production of a broad assortment of rolled metal. New and improved materials, including polymer and ceramic, should be introduced into machine building, of course, under the condition that their quality specifications are significantly improved.

/3. Ferrous metallurgy./ The solutions to the aforementioned problems will depend to a considerable degree on the production of materials, and above all on the condition of ferrous metallurgy. Yet while capital investments in ferrous metallurgy under the 8th Five-Year Plan amounted to 44.2 percent of all the investments in machine building and metal processing, under the 10th Five-Year plan they comprised 27.2 percent, and in 1981 -- 24.4 percent. This

increased the degree to which ferrous metallurgy is behind the demands of machine building. Moreover, the investments received by ferrous metallurgy during the 16 years (1966-1981) -- 41 billion rubles -- have been used quite ineffectively. While in industrially developed countries backward Marten production has been in the process of elimination, the Minchermet has increased the smelting of Marten steel by 35 million tons from 1960 through 1980. In 1980 it comprised 60 percent of all the steel that was smelted. During these years the USSR did not start up a single mini-plant. These simultaneously solve the problems of economical utilization of scrap metal and relieving the metallurgical giants of the production of small amounts of rolled metal, and they are highly effective during construction and operation. At the same time in the world practice of the development of metallurgical production, for example in Japan, greater significance is being attached to the construction and utilization of mini-plants.

During the years under consideration there was little change in the assortment of our rolled metal products -- the proportion of thin sheet metal even decreased, and the proportion of cold rolled steel only increased from 11 percent to 16 percent of all the production of sheet metal.

No significant progress was made in supplying rolled metal production. As a result, during past years there has been no significant expansion of the assortment or quantity of profiles and sizes of rolled metal. At the beginning of 1982, the USSR produced only about 4,000 types and sizes of rolled metal.

The Minchermet, while providing for high productivity of "its own" branch and "effective" utilization of rolling mills, is actually causing an increase in the metal-intensiveness and labor intensiveness of machine building and is increasing the "production of shavings" and making the technical equipment it produces heavier.

/4. The production apparatus of machine building./ The implementation of all of the aforementioned tasks will depend to a significant degree on the nature of the production apparatus for machine building -- its equipment, machine tools and machines. It is necessary to make a planned change in the ratio between equipment which is based on processes of cutting metal and technical equipment for plastic deformation and welding in favor of the latter; to expand the application of equipment for electrical and chemical technologies, automated technical equipment, and especially processing centers with the introduction of numerical program control, with a flexible combination of simpler and less expensive lathes (cutting-off lathes and thread-cutting lathes) for the performance of simple operations; to change sections, shops and enterprises over to flexible automated production (GAP); to introduce robots extensively; and to increase significantly the proportion of technical equipment for modern finishing and completion work and all other kinds of technical equipment that provides for high quality of the final product.

/5. Renovation and modernization./ It is necessary to significantly accelerate the renovation of the country's production apparatus and at least double the rate of removal of equipment (instead of the present 2.3 percent, increase it to 4-5 percent annually under the next 2-3 five-year plans). In

order to carry out this task, it is necessary to essentially increase the effect from each new generation of technical equipment, and also to reduce the production cost and the price per unit of effect. The orientation toward consistently making the unit of capacity (effect) less expensive should be the starting point for determining the prices for all newly created technical equipment. When evaluating all kinds of technical equipment one should fully take into account the criteria of socio-economic effectiveness, the creation of the proper conditions for maintenance and safe later processes, and the observance of ecological normatives.

An important method of accelerating the updating of the production apparatus is modernization of technical equipment. This is being done on a small scale and without the participation of the equipment producers in a primitive way, frequently perfunctorily, and it is always costly and not very reliable.

It is not without interest to note that in foreign countries there has been extensive development of the purchase, sales, operation and modernization of used equipment by the producer firms. They are willing to purchase or accept for modernization the machines they have produced previously, and they either restore the initial parameters of this equipment or bring them up to the levels of the latest new models. This sharply raises the technical level of modernization and produces a great savings on metal and all other expenditures. This practice should become widespread here, and it should be planned for machine building ministries and associations.

/6. Problems of the organizational structure./ The cornerstone of the organizational model of socialist machine building should be specialization and, on the basis of this, concentration of production. It has repeatedly been discussed on the pages of EKO that the large scope of the stock of metal processing equipment in the USSR is related to the fact that it is as though the country had "three machine building branches": the first -- machine building plants of machine building ministries, the second -- machine building plants of nonmachine building ministries; and the third -- mechanics shops and productions at nonmachine building enterprises and organizations. According to our estimates, 45 percent of the country's stock of metal cutting equipment is concentrated in the third kind of machine building. Attention should be given to the fact that 30 percent of the stock of equipment of machine building plants is in the auxiliary -- repair and instrument -- shops of these plants, that is, they cannot be used for producing new technical equipment. It is necessary to strengthen object specialization, overcome dispersion of the production of the most important kinds of technical equipment among various departments and tens and hundreds of enterprises, and to advance regularly along the path of technological and part specialization on the basis of the development of interbranch production, specialization and separation of the production of parts and components for machines. This process can develop initially at the intra-ministry and regional levels, at specializing semi-finished product, instrument and repair and mechanics shops of large enterprises in the output of products for the needs of their branches or of a given region. It is extremely effective to have the same path be taken by the Mintraktorosel'khozmash, the council of directors of the Minelektrotekhprom of the Northwestern region and others. This practice should be spread, and a stockpile should also be accumulated for extensive development of

specialization in parts, technology and especially functions (following the example of the bearing industry).

Unification and normalization should be mandatory at the branch and ministry levels, should be guaranteed in the system of standards, and should be regularly advanced to the inter-ministry general machine building level.

A constituent part of the organizational structure of machine building should be the network of machine building enterprises which specialize in non-mass and even unit production of nonstandardized special technical equipment and fittings on orders from nonmachine building enterprises and scientific research institutes.

#### Resources for Further Development

What resources are necessary for carrying out the program for the development and improvement of machine building?

/First/ -- an increased share of industrial investments for machine building.

/Second/ -- gradual elimination of losses associated with the inadequate development of various branches of machine building. Immense expenditures will be reduced as a result of the production of a sufficient set of technical equipment for transportation-moving, packaging, warehouse work, and so forth.

/Third/ -- a large and extremely important source is made up of the immense material and labor resources of the "machine building" sector, that gigantic physical economy which exists and is developing at the present time in all nonmachine building branches. Resources which produce an extremely small return should gradually be released, and under conditions of specialization, the return from them will increase sharply. The strategy in this area should consist of the following stages: it is necessary first of all to change the structure of domestic machine building. It would be expedient under the 12th Five-Year Plan to give it additional special-purpose investments in order to provide for sufficient volumes of production of replacement spare parts and components for the repair and modernization of all metal processing equipment and for increasing the capacities of the instrument industry and specialized plants for producing technological fittings. This would make it possible to release a large part of the stock of metal processing equipment which is being used in auxiliary shops of machine building itself.

The released capacities should be switched over to expand the production of new technical equipment and mandatory output of spare and replacement components and parts for the repair and modernization of metal processing equipment which is produced by these plants. This, in turn, will make it possible gradually to take the load from the gigantic stock of metal processing equipment in nonmachine building branches.

After this, serious organizational work will be required in the branches and regions for expedient utilization of a considerable part of this overgrown stock in order to create interbranch production lines, to develop machine

building "custom tailoring ateliers"; to develop machine service; and to expand the production of various kinds of household equipment.

The /fourth/ source is elimination of currently existing shortcomings in the utilization of available machine building capacities -- the low level of shift work, losses of time of the workers, increased metal wastes, and so forth.

Finally, the /fifth/ source should be the "structural effect" which will be the result of improving the entire structure of machine building production -- the progress of the stock of equipment, technology and materials that are used, the progress of the organizational structure, and, above all, a rise in the level of specialization and concentration of specialized production. It would apparently be expedient to begin this restructuring with the establishment in the management agencies of the basic principles for the development and organization of machine building and, naturally, not using old organizational principles as bases for the plans for large new enterprises, to increase the reserve capacities for specialized production in a planned way with a gradual dying off of natural business. At the same time, it is necessary to eliminate methods of evaluation, accounting and planning which make natural business "advantageous" for enterprises and to increase the payment for capital metal cutting equipment which is used in nonmachine building branches and enterprises.

In my opinion, /it would be expedient to create above the ministry level state union-republic agencies for management of the group of machine building branches, which should guide the development and implementation of a general machine building technical policy, the development of interbranch production lines, and technological and functional specialization and coordination work within the large territorial machine building centers./

Under these agencies it would be expedient to create large general machine building scientific research institutes, which would develop long-range economic and organizational-production problems related to the development of machine building.

Consistent realization of the system of measures that has taken form for improving machine building will be a most important step in changing the national economy over to the path of intensive development.

#### FOOTNOTE

1. In 1982 when the output of motor vehicles amounted to 11.8 million units, the output per 1 worker reached 14 units.

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## RENOVATION OF LIPETSK METALLURGICAL PLANT RELATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 113-122

[Article by M. V. Dashevskiy, candidate of economic sciences, Lipetsk Polytechnical Institute (at the time of the events described in the article, the author was working as chief of the planning division of the Svobodnyy Sokol plant): "The Path of Renovation"]

[Text] The Lipetsk Svobodnyy Sokol metallurgical plant is the country's largest producer of iron discharge pipes. It provides for about one-third of the unionwide production of this product. Put into operation in 1934, the pipe casting shop was one of the first in prewar five-year plans. It has steadily increased the output of pipes: 1935 -- 25,000 tons, 1940 -- 41,950 -- 67,000, and the middle of the 1960's -- 140,000 tons. By that time centrifugal and semicontinuous methods of casting pipes had become firmly established in pipe casting production, and shop No 1 of the Svobodnyy Sokol plant, which used the carousel method, was worn-out and obsolete.

Carousel casting is a cumbersome multi-operational process. The majority of workers worked in extremely unfavorable conditions: the noise, the vibrations, and the gas and dust in the air exceeded the permissible sanitary norms many times over, and the temperature in individual working positions during the summer reached plus 50-70 degrees centigrade. The conditions were especially difficult for workers on the cleaning belt and the bearing heads, the operators of walking crane. There was an occupational hazard for core makers who worked summer and winter up to their elbows in a cold mass of core compound, as a result of which the workers frequently suffered from rheumatism. The people who worked with the asphalt baths covered their face and hands with a special coating in order to protect the skin from the acid vapors of the rock coal resin. In some places the buildings and structures were completely dilapidated.

The central committee of the trade union of workers in the metallurgical industry and the Lipetsk Oblast trade union council issued a categorical demand that the operation of the shop be halted. On 10 August 1965 the presidium of the oblast trade union adopted a decision to operate shop No 1 of Svobodnyy Sokol only until 1 January 1966. After capital repair the physical condition was no longer critical and working conditions improved somewhat.

Taking this into account, the presidium extended the permit for operation until 1969. But immediate renovation was needed.

According to the plan proposed by the Lengipromez [Leningrad State Institute for the Planning of Metallurgical Plants] (its development would have cost the plant 300,000 rubles), it was necessary to halt the shop and remove almost all of its buildings, that is, actually to construct a new shop. For the period of construction it was necessary to find work for 1,500 skilled casting workers. According to the estimate, the renovation would cost 12 million rubles, but it actually cost twice this much. During the period of construction the national economy would lose 200,000 tons of pipes.

The plant rejected this plan, adopting a more efficient solution of renovating the shop without halting its production, renovating the buildings and structures and replacing the carousels with machines for centrifugal casting. The plant collective took on an immense responsibility, since it had to carry out the entire volume of work without prepared technical specifications and without external financing or funds for equipment, counting only on its own forces and utilizing funds for capital repair and the fund for development of production.

They created an initiative group made up of engineering and technical personnel and the most skilled workers, headed by head engineer (now plant director), A. P. Usachev, and shop chief, B. M. Sobolev. It included the assistant shop chief for equipment, F. L. Berkovich, the shop electrician, I. A. Stolpovskiy, the leader of the welding brigade, M. V. Gosteyev, the electrician, B. I. Lipekin, and the welders M. V. Tolcheyev and I. T. Znamenshchikov. The staff for organizing and carrying out the work was the plant party committee headed by L. N. Polovinkin (now secretary of the Lipetsk CPSU Gorkom). The plant management and party committee went over all questions from development of the plan to the introduction of new equipment.

Shop specialists, with the help of workers in plant management, developed the technical specifications in a short period of time, solving complicated engineering problems and determining the optimal variant of the distribution of the new technological flowlines without a fundamental restructuring of the buildings. In particular, it was necessary to select a place for the centrifugal machines which were to replace the dismantled carousels. The carousels occupied two floors of the casting bay, and it seemed that the obvious thing to do was to place the centrifugal machines on the second floor where the main work areas for servicing the carousels were located. But this positioning increased the volumes and complicated the construction and installation work, it required cumbersome foundations for the machines and roasting furnaces, and it made working conditions worse since the work space was reduced. The basic technological equipment was used as a starting point for arranging the rest of the shop. What happened? Only individual sections were dismantled, without violating the integrity of the construction designs. Why did the Leningrad workers not take this path? Primarily because the pipes coming from the machines to the roasting furnaces crossed the path of the electric car that brought in the liquid iron. The plant specialists found an original solution -- a pneumatic hook transporting mechanism.

In order to reduce the volumes of work and the time periods for the renovation and to economize on funds, they retained the existing industrial rain gutters, gas lines for furnace gas, pipe lines for industrial and drinking water, compressed air, machined heating ventilation, systems for placing metal charges into the cupola furnaces and for transporting molding materials from the warehouse to the production area and liquid metal from the cupola furnaces to the casting equipment, as well as the basic stock of lifting and transportation equipment.

The renovation began with the re-equipping of the casting division. Since at that time the plant had no funds for acquiring the necessary equipment, the repair services of the enterprise had to make it. In a short period of time, they designed and manufactured the Sokol centrifugal machines for casting pipes with a diameter of 100-150 millimeters and a length of 3 meters.

Subsequently, thanks to active assistance from the Main Administration of the Pipe Industry of the USSR Minchermet, and primarily its chief, Ya. Ye. Osada, who energetically supported the plant's initiative, additional financial resources were allotted for the completion of the renovation. These were acquired as a result of redistributing the funds for capital repair and the fund for production development, and also the funds for standard and nonstandard equipment. This made it possible to install in the place of four carousels centrifugal machines of the Siblitmash plant, and then to replace the Sokol machines with them, increasing the length of cast pipes to 4 meters.

The dismantling of the carousels, the construction of the foundations for the centrifugal machines and the laying of the underground mains -- all this work was done on three shifts. At the same time they were manufacturing the Sokol machine and the conveyor for the roasting furnace. Small nonstandard equipment was made directly in the shop by workers of the mechanics group. In specially organized courses the leading engineering and technical workers of the plant familiarized 120 workers with the new equipment.

Practically immediately after the completion of the restructuring of the first section, the Sokol centrifugal machine began to regularly produce the planned quantity of pipes. Then they began to install the second centrifugal machine. Some of the workers who were released were sent to reinforce the construction brigades and the rest were placed at other enterprises of the city. Subsequently the more productive centrifugal machines made it possible to halt two more carousels. The centrifugal machines were put into operation in pairs, in parallel with one another.

In the core making division, they sequentially installed four flowlines for producing cores. Modernization of the smelting division made it possible to increase pipe production, to reduce the labor-intensiveness of the work, to change the profile of the cupola furnaces (they were changed over from "jacket" to sprinkling cooling), to construct a system for forcing air, to introduce continuous output of iron and slag and a bucket with an original design for loading coke, and to re-equip the warehouse for charges. As a result, there was a sharp reduction of the expenditure of coke, refractory materials and funds for repair, and the productivity of the cupola furnaces increased from 20 to 30 tons per hour.

Technical re-equipment of the shop culminated with the renovation of the pipe finishing division. In conjunction with the Novosibirsk Siblitmash plant, the plant designers in a relatively short period of time developed, manufactured and installed a conveyor line which comprehensively mechanizes and automates the transfer and finishing of pipes. The line consists of four separate flowlines, and each has one distribution and two finishing conveyors. The latter transfer the pipes first to the cleaning machines and then to the hydraulic presses for testing. All operations for hydraulic testing of pipes are automated. The hydraulic press which was developed and manufactured by workers of the shop will release 36 workers and greatly improve working conditions. As a result, all there are remaining of the 137 people who were engaged in in the cutting-off, cleaning, cropping and hydraulic testing of pipes in the pipe finishing section before the renovation are 4 people per shift. They control all processes from special panels. The re-equipment of the asphalt baths and the replacement of the coal tar with bituminous coal improved the working conditions of the service personnel.

The walling off of the moving mechanisms and areas, and the provision of protective devices for the equipment, and light and sound signals, as well as exhaust devices for dust and gas removal equipment, the protection of the workers from thermal radiation, noise and vibrations, the better lighting of the working positions, and the comfortable places for rest sharply reduced injuries and diseases of the workers. Losses of working time because of temporary disability decreased almost to one-third the previous level.

A great deal of attention has been devoted to the interior of the shop. The lighting of the premises and equipment in keeping with modern requirements for scientific organization of labor, the colorful panels, the corners with aquariums filled with live fish, the paved roads and sidewalks, and the squares with flower beds and fountains have created pleasant surroundings.

The old off-duty facilities did not meet the shop's requirements, but it was not able to construct new ones. The only possible path that was left to take was to utilize the existing shop area efficiently. In areas of the production building which were released, where core making machines and drying furnaces stood previously, they placed offices for the shop chief and his deputies, the dispatcher room, rooms for the party bureau and the shop committee, the public health point, technical safety offices, offices for technical and political training, and a recreation and reading area which is designed and equipped as well as the conference rooms in some plants. Thus the former administrative building was released for off-work needs. It was equipped with a dining room and living areas -- it is the pride of the shop. It has everything necessary to make a person feel comfortable: the walls are finished with wood, tile and colorful plastic, the frosted glass of the ceilings softly diffuses the light, and on the walls are pictures, stained glass and large mirrors.

The renovation has sharply increased the output of high-quality products and improved all technical and economic indicators of production. The production of pipes in linear meters (in adjusted figures) has doubled as compared to 1966, defective work has decreased from 8 to 3.3 percent because of centrifugal casting, and the external appearance of the pipes has improved

substantially. Utilization of self-packing rubber seals has considerably accelerated the laying of pipe lines and made it less expensive so that now they are competitive on the world market. The number of personnel has decreased from 1,400 to 751, or by 46 percent. Labor productivity has increased approximately 4-fold. Having replaced the carousel method of casting pipes with the centrifugal method, the shop changed over from complex multi-operational technology to fewer operations. In spite of the active mechanization and automation of production, a considerable quantity of equipment has been released. Improvement of the conditions for its operation (a sharp reduction of the dust content in the air and the volume of molding and core materials that are used and so forth) has reduced expenditures on maintenance and repair. In the final analysis, the production cost of pipes has decreased. While 1 linear meter cost 4.1 rubles before the renovation, now it costs 3.2 rubles. During the year, as a result of reduced production costs, there will be a savings of 5.5 million rubles. Thus the expenditures on renovation -- 3.7 million rubles -- will be recouped in less than a year.

The nature of the labor and the composition of the workers have changed radically. They have basically eliminated less skilled, manual labor and organized new working positions for servicing machines and mechanisms; as a result, the average skill level of the workers has risen, and their average earnings have increased from 158 to 208 rubles.

The advancement of the art of production because of the new technology, comprehensive mechanization and improvement of living and working conditions has created a new work atmosphere. This has been reflected in maintaining cleanliness and order in the shop, in increased labor and production discipline, and in the relations in the collective. Suffice it to say that while there is an overall shortage of labor force at the plant, the shop has been fully staffed with personnel. On the office door of the shop chief hangs an unusual poster: "The shop does not need workers." The collective of pipe casting shop No 1 of the Svobodnyy Sokol plant is the most stable in the branch: in 1982 labor turnover amounted to only 1.2 percent as compared to 30 percent in the year preceding the renovation and 7 percent as an average for the plant. New workers who replace those who go on pension, for training or for service in the Soviet Army are accepted only on recommendations from two permanent workers of the shop.

The complicated technical and organizational tasks of renovation under the conditions of production in operation activated the mass technical creativity of the workers in the shop. During the period of renovation 6 inventions and 269 efficiency proposals were introduced, with an overall economic effect of 1.7 million rubles.

But why has the plant been able to do what a powerful planning institute could not? It seems that the main reason is that the plant was interested in rapid completion of the renovation with minimal expenditures. Outside planners are indifferent to whether the plant is in operation during renovation or not. And when the plan for renovation was developed locally, they tried to reduce the volume of construction and installation work, and the volume of planning work as well. The collective was interested in the final result of the renovation and not in its volume.

They also took on a number of other jobs conscientiously. Thus the first pipe casting machines were installed not according to the plan, but in order not to halt production on other machines. Then they had to be re-installed, but the double installation was made up for by the fact that the shop fulfilled the planned assignments without interruption.

The people's hard work was crowned with success. In the place of the old shop which had outlived its time, there appeared a new shop which deserved the title of a shop with an advanced culture of production. The group of the plant's workers who participated directly in the planning and renovating were awarded the prize of the USSR Council of Ministers for the most outstanding plans and construction according to them.

The renovation of pipe casting shop No 1 of the Lipetsk Svobodnyy Sokol metallurgical plant showed the effect that can be produced by technical rearmament of production and the inexhaustible possibilities that are at the disposal of the collective which is inspired by great goals and is skillfully organized.

[The following material appears in separate boxes within the above text]

The fulfillment of the plans for industrial, agricultural, housing and cultural-domestic construction and improvement of living conditions for the Soviet people depends essentially on the quality of work of the pipe industry. The leading position in the balance of world production and consumption of pipes still goes to metal, steel and iron pipes, although production of pipes made of glass, plastic, asbestos cement and other nonmetallic materials is expanding. The proportion of iron pipes in the overall output in our country amounts to about 7 percent, which is considerably less than the desired level. As a result, steel pipes are frequently used in places where, according to conditions for durability and other parameters, it would be expedient to use iron pipes. For instance, a pipe line made of iron pipes, because of their high anticorrosion resistance, can serve effectively for 100 years, while a line made of steel pipes will become unusable in 25-30 years. This merit is combined with high durability (iron pipes can withstand a pressure of 40 atmospheres) and the fact that the capital-intensiveness is one-half to one-third that of steel pipes. Therefore they can be used not only for water lines and sewerage networks, but also (according to the experience of the United States, France and the FRG) in gas and other high-pressure pipe lines.

From the Book of Responses

It is very nice that your shop has become unrecognizable. The collectives of the plant and shop have done a lot of work for renovation, which has made it possible to double pipe production and triple productivity, but the main thing is that the labor of the people has been transformed. It has been mechanized, normal sanitation conditions have been created in the shop, and the carousel operators have become a thing of the past. I congratulate you on this success on behalf of the board of the USSR Ministry of Ferrous Metallurgy. Thank you very much.

Minister I. P. Kazanets

Along with the quite deserved excitement about what we have seen, we have received a clear lesson in how the solidarity and goal-directedness of a collective can do what is thought to be impossible.

We are making every effort to take the measures for improving the conditions for labor and life which were applied at Svobodnyy Sokol and introduce them in our collectives.

Participants in the interbranch seminar of chairmen of factory and plant committees and local committees.

This is the first time we have seen such consistent concern on the part of the shop management for the development of production and the well-being of the workers. The dining room, off-duty facilities and the day room are magnificent. We have visited many industrial enterprises and have never seen anything like this.

Workers of the Institute of Casting Problems  
of the UkrSSR Academy of Sciences

In pipe casting shop No 1, primary attention is devoted to the creation of highly productive, safe working conditions. The shop's sanitary and living premises are exemplary not only in the branch, but also in the country's national economy as a whole.

V. V. Burmistrov  
Technical inspector of the AUCCTU

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## ROUND TABLE DISCUSSION DEVOTED TO SUBSIDIARY FARMS

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 123-141

[EKO Round table discussion at the Kemerovo Oblast Council of Trade Unions:  
"The First Steps of Subsidiary Farms"]

[Text] The May (1982) Plenum of the CPSU Central Committee called the solution to the food problem one of the most important socio-economic tasks. The Food Program is the business of each Soviet person, of each labor collective. And if each person approaches implementation of this vitally important task with a full measure of responsibility, that is, creatively, the most diverse approaches will undoubtedly be found, which will reflect the branch, geographical and economic specifics of the given labor collective.

To generalize the approaches of enterprises to the creation of subsidiary farms was the subject of an EKO round table meeting in Kemerovo. The task of the meeting was to review in a unique way the achievements of the leading workers so as to enrich everyone with their experience and at the same time give a shove to those who have doubts or have gotten a slow start. Kemerovo Oblast is fairly widely known for its experience in creating food shops at enterprises. A clear example is the Belovskaya GRES which delivers fish raised in the warm water to the tables of the Kuzbass workers. So much has been written about the "Fish Factory" in the Kuzbass (including in EKO -- see No 12 for 1982) that the organizers of the meeting did not consider it necessary to return to their experience once again.

Participating in the meeting were:

V. P. Astashkin, deputy chief of the Tayginskiy division of the Kemerovo railroad;

V. V. Bagayev, assistant director for personnel and services of the Salairskiy ore enriching combine;

N. A. Bagriy, director of the Yurginskiy automotive base of the Kuzbasstransstroy trust;

P. N. Balashov, deputy director of the Yuzhno-Abinskaya station of Podzemgaz;

D. D. Grebenschikov, deputy director of the Western Siberian metallurgical plant for agriculture and public catering;

A. K. Kachura, chief of the Krasnobrodsk loading and transportation administration;

N. P. Koval'chuk, deputy director of the Yurginskaya sausage factory;

V. Ye. Kralinov, deputy director for management problems of the Oktyabrskaya mine;

V. A. Moskalev, director of the Khimprom production association;

I. F. Rabayev, director of the Mary furniture factory;

N. V. Svetlanov, chairman of the trade union committee of the Chernigovskiy mine;

N. D. Simonchuk, chairman of the trade union committee of the chemical machine building plant;

V. P. Taskayev, director of the Yaysk timber combine;

A. M. Tye, general director of the Kuzbasselektromotor production association;

N. A. Sherin, deputy director for management problems of the Zapadnaya mine.

The meeting was conducted by the chief of the division for trade and consumer services of the CPSU Obkom, V. I. Kalinin, the chairman of the Kemerovo Oblast trade union council, B. I. Okushko, and the secretary of the oblast trade union council, V. U. Nemiro.

B. I. Okushko: -- As early as 13 March 1979 the bureau of the party obkom and oblispolkom adopted a decree which established the assignments for industrial enterprises, organizations and institutions for creating new subsidiary farms and developing existing ones. This work was developed especially well after the May (1982) Plenum of the CPSU Central Committee. During 1982 alone 81 subsidiary farms were organized, after which the overall number of them exceeded 300. They included 132,000 hectares of agricultural land, of which 83,000 hectares were plowed. Subsidiary farms have 36,800 head of cattle and 340,000 head of poultry. During 1982 they received 9,000 tons of meat, 39,000 tons of milk, 30 million eggs, 840 tons of fish, 37,000 tons of vegetables and 32 tons of honey.

The farms are based on mechanized labor. They have 1,200 tractors, 330 grain combines, about 500 loaders and other agricultural equipment, including

trailer equipment. These are the production plans for subsidiary farms of the oblast in 1985: meat -- 18,000 tons, milk -- 39,000 tons, eggs -- 32 million, fish -- 1,700 tons, vegetables -- 50,000 tons, potatoes -- 62,000 tons and honey -- 214 tons.

The Kuzbass is an industrial region, and therefore subsidiary farms are called upon to make an important contribution to providing the population with food products and "relieving the load" of our suppliers, particularly Altay Kray (see Table 1).

Table 1. Proportion of Products of Subsidiary Farms of Industrial Enterprises in the Overall Volume of Agricultural Products of Kemerovo Oblast, in Percent

Products	As of 1 Jan 1983	As of 1 Jan 1986
		(plan)
Potatoes	18	20
Vegetables	33	39
Meat in live weight	8	13
Milk	6	6

We have leading workers -- the collectives of the Belovskaya GRES, the Kuznetsk metallurgical combine, the Western Siberian Metallurgical Plant, the Chernigovskiy mine, and others. We also have our backward ones. But we have no need to shout praises or hand out condemnation. I think that the people gathered here are joined together by one goal -- the implementation of the Food Program. We need to answer a number of questions. For example, what do subsidiary farms provide for the workers of the enterprise? Does keeping a subsidiary farm affect labor discipline and personnel turnover? How are the products of the farms distributed in the labor collective? And, of course, it is important to explain how to make a subsidiary farm both economically and socially advantageous, so as not to forfeit the advantages of specialization (see Table 2).

Table 2. Ratio Between Production Cost of Quintal of Agricultural Product Produced by Subsidiary Farms of the Kuzbassugol' VPO Trust and Kolkhozes of the Oblast in 1982, in Percent

Products	Sovkhozes	Kolkhozes
Grain	95.3	88.1
Potatoes	90.3	88.5
Open ground vegetables	99.0	25.5
Milk	98.5	102.1
Beef	104.4	111.3
Pork	265.8	180.1
Eggs, thousands	149.5	96.7

D. D. Grebenschchikov: -- Since May 1979 Zapsib has been engaging in feed production and animal husbandry on its Antonovskiy sovkhoz. We keep 4,000 head of hogs and they produce 400 tons of meat a year. The hothouses are now producing 400-450 tons of cucumbers. A fourth hothouse is being constructed. In addition to this, we have introduced 300 bee colonies.

EKO: -- You have farms of various profiles. How do you explain this?

D. D. Grebenschchikov: -- The workers' menu should be varied. And I have not mentioned everything yet: the plant also has a fishing enterprise. This is a facility with an area of 2,000 square meters in which we have installed containers with volumes of from 2 to 18 cubic meters with independent water supply. In order to create the necessary conditions, we have introduced a center for water preparation with a system of control and automatic maintenance.

In the containers are groups of carp of various ages, with an overall weight of 10 tons. The weight gain amounts to 2 tons in 10 days. The fish planting material is shipped in, but we intend to have our own. Mixed feed is delivered by the local plant, but we are already planning to produce inexpensive feeds from table scraps. The polycyclical plan for running the farm will make it possible to assimilate the propagation of trout and sturgeon in an amount of no less than 300 tons a year.

B. I. Okushko: -- The Zapsib workers have not constructed any special premises or containers. All this was previously a production area with boilers.

D. D. Grebenschchikov: -- We sell the fish which we do not eat fresh. There is running water in the containers and in the future we intend to change over to a recycled water supply. And the meat is fresh: the hog complex on the Antonovskiy Sovkhoz has its own slaughter shop with refrigerators.

B. I. Okushko: -- The metallurgists are demonstrating clearly how diverse subsidiary farming can be. And they have not even had to take out loans; they have made do with their own capital investments.

EKO: -- Antonovskiy -- is this the sovkhoz under your patronage?

D. D. Grebenschchikov: -- This sovkhoz is our plant's shop. The agricultural products are either used for public catering for the metallurgists or they are sold through culinary stores and cafeterias.

EKO: -- A steel worker can smelt steel and not warm up water for fish. How did you find personnel for a business with such diverse profiles?

D. D. Grebenschchikov: -- We were concerned about personnel even before the creation of the sovkhoz and we did not experience any special difficulties, although, of course, a miner is not an agronomist and a rolling mill operator is not a zootechnician. Well, one might say that the labor of machine operators is universal for all branches.

V. I. Kalinin: -- Although many people prefer to leave the country for the city, fortunately not all people are alike, and some do not want to be separated from the land completely. In agricultural production -- in the city now -- their knowledge, abilities and skills are more useful than ever. Their labor is typical and the conditions are pretty good.

N. A. Sherin: -- When creating the subsidiary farm at the Zapadnaya mine we were concerned about selling the products. We built the Ugolek food store. In it both the manager and the sales people work on a public basis, and they distribute the products according to the participation of the subdivisions in their production. The measure of participation is determined by the section trade union committees. We distribute hog raising products. The skim milk obtained from our cows goes for fattening piglets and the cream goes for public catering. We raise coypu furs and sell them to the rayon consumers' union, and in exchange we receive concentrated feeds.

EKO: -- Apparently the scale of your subsidiary farming is not great yet. Do you plan to expand it?

N. A. Sherin: -- We are well aware that to run this kind of farm does not mean that we will produce any significant number of head of livestock and consume meat or milk. It is necessary to create a broad infrastructure, which cannot be done all at once. We are striving to take advantage of the possibilities we have. Thus we are growing mushrooms in the mined areas. We are constantly expanding our hothouses.

V. U. Nemiro: -- Who are your public sales personnel and the manager of the Ugolek store?

N. A. Sherin: -- The sales personnel are selected in the sections, and the manager is appointed by an order for the mine: he is the assistant director for personnel.

V. Ye. Kralinov: -- I shall discuss the experience of the Oktyabrskaya mine. Since October 1981 we have been raising sheep. Even last year we obtained 208 young from 200 ewes. In December we received 3,500 tons of meat and a half ton of wool. And we also sold the hides.

EKO: -- Why did you select sheep raising in particular?

V. Ye. Kralinov: -- Indeed our selection might seem strange. For not a single farm in Kemerovo Oblast has this profile. But we know that sheep were raised in the Kuzbass in the past. Why not restore the past? Moreover, we have at least three favorable factors. First, the patron Mungatskiy Sovkhoz supplies the feed; second, the mining area, where no building can be done, will make it possible to keep more than a thousand head; and third, material at hand can be used for constructing a camp -- the arched supports which were used previously, the transporter belt, and the beam plates. We have now constructed a grain storehouse and a second camp. This cost only 67,000 rubles. We think that in the future we shall be able to keep up to 3,000 head of sheep.

EKO: -- Can food scraps be used for sheep raising?

V. Ye. Kralinov: -- Absolutely, but this does not fully solve the food problem.

D. D. Grebenschchikov: -- We are processing many food scraps and have organized a special kitchen. The dining rooms on the territory of Zapsib supply fairly good material, while the scraps from the population are impure and the machines for processing them frequently break down.

B. I. Okushko: -- Magnets are a big help. The oblast has experience in using them to clean food scraps.

V. U. Nemiro: -- Are you experiencing a shortage of personnel?

V. Ye. Kralinov: -- The manager of our subsidiary farm is an experienced individual. She skillfully solves personnel problems and handles them with the support of the party and trade union organizations as well as the administration.

V.P. Taskayev: -- The basis was laid for a subsidiary farm at the Yaysk timber combine in December 1978. They took a course toward hog raising. They acquired the young animals from sovkhozes of the oblast. Today they have 1,300 hogs, of which 900 are being fattened. In 1983 they sold 50 kilograms of meat per worker.

B. I. Okushko: -- The profile that was selected is probably the simplest one, and at the same time the workers also need other agricultural products. Do you intend to broaden the profile?

V. P. Taskayev: -- Of course, one cannot live on pork alone. And we do not intend to stop here. By the end of the five-year plan we shall have 100 cows in the new barn, we will have completed construction and will receive vegetables from 1,000 square meters of winter hothouses. We have begun to create a small horse farm with 50 head.

B. I. Kalinin: -- It would be interesting to know why you chose a horse farm.

V. P. Taskayev: -- Our collective has representatives of many nationalities and some prefer horse meat to port. And then too we will have our own kumiss.

EKO: -- What does it cost you to have "nonprofile" agricultural products?

V. P. Taskayev: -- The pork is sold at 2 rubles 50 kopecks per kilogram and its production cost is approximately 1.5 rubles. So the production is profitable.

EKO: -- How do you manage that? After all, it is not secret that subsidiary farms bring a loss to many enterprises.

V. P. Taskayev: -- We approached this problem in a way that accords with principles: we needed agricultural enterprises, but not at any price! V. Ye. Kralinov is quite right when he says that it is necessary to create an entire infrastructure. And this costs money, which lies in the production cost of the final output. But here there is a selection of economically effective variants. For example, it is inexpedient to construct slaughter shops and refrigerated compartments for the needs of our subsidiary farm. Nearby, in Anzhero-Sudzhensk, there is a meat combine with which it is possible to work under agreements. Thus specialization and cooperation are one of the ways to economy.

EKO: -- What kinds of problems does the subsidiary farm produce?

V. P. Taskayev: -- Problems which are probably typical for all. Feeds. Today the orders for concentrated feeds amount to 10 percent of the need. Land. We have been allotted 91 hectares of arable land -- a drop in the bucket with this many head of animals. Transportation. Not a single truck has been allotted from the ministry supplies for the subsidiary farm, and we can use only one of our own trucks without hampering our basic activity. A bus is needed immediately for transporting people. Roads. The 30-kilometer route to the fields crosses over rough territory. Technical equipment. There is a shortage of all kinds of it. In 1982 we received a Belarus' and two combines -- disgracefully inadequate. Finances. We have no centralized capital investments in the subsidiary farm. Personnel. Our workers attend rayon schools for training agricultural specialists, but this is not enough.

EKO: -- So many problems could easily drive one away from a cause that it useful and necessary!

V. P. Taskayev: -- All the things that I have enumerated are not complaints. I simply wanted to generalize the typical problems which are familiar to everyone. But they are being solved even today. For example, the party raykom and rayispolkom have actually provided our agricultural shop with land. Our patron enterprises are allotting seeds. The former head agronomist of the Rodina Kolkhoz, V. A. Platonov, supervised the planting and cultivation of the fields, as a result of which we received a good yield of oats and potatoes. We are receiving medications, assistance in arranging the technology for fattening, equipment and so forth.

V. U. Nemiro: -- How have you organized the distribution of products among the workers?

V. P. Taskayev: -- We have arranged supervision of the distribution. It was mandatory for zooveterinary specialists and bookkeepers to be in attendance during the slaughtering of the hogs and the purchasing of piglets. The sales take place through the ORS [Department of Workers' Supply] food store. The manager of the subsidiary farm has a schedule for sending meat to the various shops and divisions of the combine. We also provide meat for the dining room of the timber combine.

V. I. Kalinin: -- Has the subsidiary farm had any effect on the labor collective?

V. P. Taskayev: -- Along with other measures, it has had an effect, and an appreciable one. Labor discipline has increased. During the past 2 years labor turnover here has decreased by more than 10 percent.

B. I. Okushko: -- It has been noted that matters with subsidiary farms are arranged best in places where the higher management are interested and work with them. An example is the Belovskaya GRES. Viktor Petrovich Taskayev is one of these managers.

V. I. Kalinin: -- One cannot but notice and take into account the national composition of our collective. For this is also means a creative approach to the formation of the production structure.

N. P. Koval'chuk: -- We at the Yurginskaya sausage factory are probably doing the same thing as many others are. First we purchased the sows, obtained piglets from them, and sold 100 of them to the workers. The factory is the patron enterprise for a boarding school, and the school looks after a pigsty. But it has already been built and is fully mechanized. There are 350 head on fattening and they have a weight gain of more than a half kilogram per day. We have planted 200 hectares in grain crops, and the yield was used for mixed feeds. We utilize food scraps from the dining room and the boarding school. We have our own technical equipment (we purchased two Koloses) and we have our own seeds. The plan includes the production of 100 kilograms of meat and 80-85 kilograms of vegetables per worker. The development of the subsidiary farm has been reflected in the collective: there are fewer thefts, and labor turnover has decreased.

V. U. Nemiro: -- Is there a direct relation here?

N. P. Koval'chuk: -- The collective has made a decision: if someone has been caught stealing he is deprived of his right to use our store for 2 months. This is apparently a correct measure, and it has worked.

EKO: -- Is the subsidiary farm not a burden to the administration of the enterprise? After all, it adds many new problems.

N. P. Koval'chuk: -- It is, naturally, an additional load, but it is not a burden. It is a worthwhile cause. The efforts are being recouped and will continue to be recouped in the future.

V. A. Moskalev: -- I shall not conceal the fact that the Khimprom production association has nothing to boast about. This is a difficult business -- the subsidiary farm. All it amounts to so far is going around to various offices trying to get them to allot land which they need. We were lucky because there were two buildings on the plot of land that was allotted to the association. The buildings were equipped and young hogs were placed in them. The first meat has already been sold to the workers. But as soon as the premises were found, the feed problem arose. We are collecting scraps from the population and adding concentrates. There is no machinery for the planting, and it will be necessary to turn to the sovkhozes for assistance. By the end of the five-year plan two pigsties will be in operation and will accommodate 500 head each. And this will be our contribution to the Food Program.

B. I. Okushko: -- Of course you have objective reasons, but still your rates are slower than those of other collectives. How do you explain this?

V. A. Moskalev: -- We have already drawn attention to the fact that a subsidiary farm is a comprehensive problem which cannot be solved on the run. And a complicated matter requires resolve, conviction and confidence in ones powers. It seems to me that we do not have enough of these.

EKO: -- The collectives of the Kuzbass are beginning with hog raising while Khimprom is stopping there. What are you counting on?

V. A. Moskalev: -- On cooperation, of course. And we ourselves, industry, must be concerned about cooperation with the kolkhozes and sovkhozes.

V. U. Nemiro: -- This kind of experience has already been accumulated in the oblast.

I. F. Rabayev: -- The subsidiary farm of the Mary furniture factory is a small one which is located in an agricultural zone. When it was opened in October 1981 we decided to fatten hogs and later to reproduce them. We took into account the availability of inexpensive feed -- wastes from the production of the alcohol combine and concentrates. We have a small collective, and cooperation helps here: during the winter, in exchange for meat we will receive tomatoes and cucumbers from the Kemerovo and Novokuznetsk factories.

B. I. Okushko: -- And have you received many vegetables through cooperation, Ivan Fedorovich?

I. F. Rabayev: We have sent the meat right on time, but we have not seen anything of the cucumbers. But we know that in the end the Kemerovo and Novokuznetsk workers will not let us down and they will fulfill their commitments.

V. P. Astashkin: -- The subsidiary farm of the Tayginskiy division of the Kemerovo railroad is spread throughout the cities of Tayga and Topki. At first we intended to assign a small farm to each organization. But after having thought about it we found that it would be more expedient to construct one pigsty for 600 head, and then each organization would have its own responsibilities -- one would plant peas, another would set out potatoes, and a third would raise something else. Practice is confirming the correctness of this decision. We are fulfilling the plan for the hothouses right on schedule, and we are receiving cucumbers, onions and even berries. We have been allotted approximately half of the land we need. But this is not the main thing. It seems to me that now we need to think about the future. We have land, but much of it is unsuitable. Within a year or two it will be impossible to harvest anything from it without fertilizers. And in general it is necessary to think about the future of subsidiary farms.

EKO: -- Do you have in mind that there might not be any in the future?

V. P. Astashkin: -- Hardly anyone would say that this is a one-time campaign. There will be subsidiary farms. But it is important to determine what they will be like so that both economic and social problems will be solved efficiently, according to a plan.

B. I. Okushko: -- What kind of patronage assistance do you give to agriculture?

V. P. Astashkin: -- One way or another it ends up in cooperation with the sovkhozes and kolkhozes. And this, in my opinion, is correct.

P. N. Balashov: -- It is good that the conversation has come around to cooperation. Our Yuzhno-Abinskaya station Podzemgaz, for example, supplies the sovkhoz with technical equipment and helps with construction, and the sovkhoz, in turn, does a lot for us in terms of agrotechnology, supplies us with seeds, and so forth. For cooperation it is important for the subsidiary farm to be large and strong. In particular, we harvest a lot of tomatoes and cucumbers in the hothouses, to the point where we sometimes have a problem selling them. The scale of production has a positive effect on the proportional expenditures.

N. A. Sherin: -- The farm for which we are patrons transferred an old cattle yard to us. It was good enough to begin with, so that we had somewhere to keep cattle. This year for the first time we have developed a plan of cooperation.

A. K. Kachura: -- When creating a subsidiary farm the Krasnobrodskiy loading and transportation administration also received solid support from the sovkhoz. This included agricultural equipment and personnel training through the village agricultural school. The students do practice work both on the sovkhoz fields and on ours. We have begun to raise piglets together. We receive an average of 32 kilograms of meat per worker. It is interesting that after we began to engage in agriculture there was a sharp drop in personnel turnover -- to 5 percent.

A. M. Tye: -- In terms of the number of personnel Kuzbasselektromotor is third in the oblast. It is not simple to create a subsidiary farm for it. What strategy should be selected? We decided that it is necessary to achieve a result as quickly as possible. This will bring confidence and support in the future. In this respect, hog raising produces the best results. The subsidiary farm now has 750 head, and by 1990 the number of hogs will be increased to 2,150, some of them from our own reproduction. The 267 bee colonies produce 3.5 tons of honey, and by 1990 there will be 500 of them. Last year we sold 6 kilograms of meat per 1 worker. In the future there will be 150 head of cattle on fattening.

V. I. Kalinin: -- Is there enough technical equipment on your farm?

A. M. Tye: -- We have quite enough for the present area. We think that we shall acquire a sufficient number of machines for new areas. We are having a more difficult time with feeds and construction.

B. I. Okushko: -- Just 6 kilograms of meat per 1 worker is probably not quite enough. How do you distribute this quantity?

V. U. Nemiro: -- And who eats the honey?

A. M. Tye: -- It is not difficult to distribute it; it is more difficult to produce more. It is distributed through orders for the various shops and divisions of the plant, and this is supervised by representatives of the plant trade-union committee. And the honey is distributed only to workers, by means of coupons from the housing and domestic commission of the trade union committee.

EKO: -- What effect is expected from the subsidiary farm?

A. M. Tye: -- A positive influence on labor discipline and personnel turnover. Incidentally, we are now able to offer work in rural areas to those who for some reason have decided to leave the city so that they do not have to leave the plant. We are constructing residential buildings there, which increases this possibility even more. We have attractive locations. When workers buy meat, fish, vegetables and honey on the territory of the plant they do not waste working time standing in line at stores.

N. V. Svetlanov: -- We were talking before the meeting and Anatoliy Manzhurovich Tye, the manager of this large association, was discussing his need for help from outside, for example, with construction. And Yashkinskiy and Kemerovskiy rayons are helping to establish the subsidiary farm for the Chernigovskiy mine.

N. D. Simonchuk: -- We at Khimmash are among the backward ones. We have constructed only one hothouse, and we did not have enough construction materials for a second one.

B. I. Okushko: -- You probably did not make strong enough demands to the plant directors? It is necessary to create public opinion in the collective, which would convince the management.

N. V. Svetlanov: -- There is not doubt that managers must be given a shove to develop subsidiary farms.

EKO: -- If it is necessary to convince the managers of enterprises, this, in addition to everything else, leads to a loss of time. And the solutions to all the other problems -- land, money, material resources and specialists -- depend on time.

V. V. Bagayev: -- We agree with that. Our Salairskiy ore enriching combine dragged out the construction and difficulties with the land arose. And yet the advantage from one's own agricultural enterprise can be significant. Labor discipline increases appreciably. Take, for example, the period when the Department of Workers' Supply was having a hard time supplying meat. It was then that we sent to the dining rooms whatever we had received from the subsidiary farm.

B. I. Okushko: -- What will it be like by the end of the five-year plan?

V. V. Bagayev: -- There will be 500 hogs and a barn for 100 brown cows; there will be ponds containing 10 tons of fish; the hothouse will occupy 1,000 square meters, or it will produce 30 tons of vegetables; and there will be 30 bee colonies.

V. I. Kalinin: -- Wheat measures are you taking to create all this?

V. V. Bagayev: -- We found a building and invited a brigade of construction workers in, and constructed a pigsty for 105 head -- for the time being. Now it is possible to keep 300 piglets in it. We have introduced the first section of the brick plant. We planted grain crops on 50 hectares and potatoes on 8 hectares. We rented a pond with an area of 68 hectares and put 1.2 million young carp in it, but we did not manage to obtain any commercial fish -- the nets which we found with such great difficulty were torn on the stumps. In the autumn of 1982 we constructed a 10-meter-high dam on the Osinovka River. The water reservoir which is formed, with an area of 50 hectares, will be our fish "field." We are preparing to construct a hothouse in the abandoned area of a lead and zinc mine, and the documentation has already been developed. Our specialists have studied the experience of the Tashtagol'skiy mining administration in raising cucumbers, onions and flowers in underground hothouses. All the sovkhozes under our patronage have refused to give us land for temporary use, and we need 1,500 hectares. Then we came to an agreement with the Gurev timber industry enterprise to transfer to the combine some abandoned land in the region of several former villages. We hope that the obispolkom will approve the agreement.

B. I. Okushko: -- Does this mean that the success in cooperation has been variable?

V. V. Bagayev: -- Precisely. But one cannot do without cooperation. For example, we did not even plan the construction of the refrigeration compartments because we have enough refrigerators in our ORS. The construction of slaughtering shops is not being planned either -- it is inexpedient with our volumes, and we will be helped by those who already have these capacities. But we must roast our own brick ...

N. A. Bagriy: -- The speakers have taken note of the role played by time in the economy. For example, while others were feeling about and taking measurements, the collective of the Yurginskaya automotive base of the Kuzbasstransstroy trust had begun to dabble in hog raising. We purchased 25 sows and found premises; after farrowing, by winter we had found other premises. We constructed a substation and a refrigeration compartment. The farrowing began again and we had about 300 hogs. We sold the first quintals of meat to our workers at 2 rubles per kilogram. The basis was laid. In 1982 we planted and harvested a crop on the land that had been allotted. We brought in construction materials: we shall be building, including a dormitory and warehouse facilities. We already have a staff -- warehouse workers, guards and a bookkeeper. I think that we are going to catch up with the sausage factory.

EKO: -- Is a cooperative organization needed for the subsidiary farms of the oblast?

V. I. Kalinin: -- Decisions are made centrally for all questions related to the provision of land.

B. I. Okushko: -- By a decision of the party obkom, a food commission, headed by the chairman of the oblispolkom, has been created and is in operation. It is responsible for coordination. Of course it will have to figure a lot of things out and provide assistance for practical workers. Thus there are several enterprises in the city of Berezovskiy and each has its own subsidiary farm. They start up a small complex and request that it be supplied with young animals, while it is easier and less expensive for large farms to deal with these animals themselves. Would it not be simpler to join forces and create one complex, but a strong one?

V. I. Kalinin: -- At one time the managers of enterprises, institutions and organizations had to be urged strongly to create subsidiary farms. Even today some of them have to be pushed and criticized for their slow rates, but the basic subject has changed for the better -- toward considering what has been achieved and the experience that has been accumulated. But the following also takes place: they produce here not only meat and milk, but also fish and mushrooms, so that they are producing, as it were, on the land, in the water and under the ground. We regularly hold conferences in various cities on the results of the year. There are issues which merit constant attention. For example, many insist on acquiring plowed land. But where is it to come from? And here they are assisted by the experience of those who utilize existing resources, including land, water, timber and underground developments. Our oblast has already been invited to exhibit its achievements at the VDNKh SSSR, where it received numerous awards. According to data of the Central Statistical Administration, the Kuzbass holds second place in the country when it comes to the development of subsidiary farms, behind only Murmansk Oblast. This situation makes it incumbent on us to solve new problems, and there are still significant reserves here.

The round table discussion demonstrated that the enterprises, institutions and organizations of Kemerovo Oblast have engaged seriously in carrying out the tasks of the Food Program. Attention is drawn to their creative approach and local initiative. Still it seems that this initiative needs coordination, which will direct it in the channel of high social and economic effectiveness of subsidiary farms. Apparently it is necessary to have a special subprogram, "The Subsidiary Farm," within the framework of the oblast's food program.

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## IMPORTANCE OF REPRODUCING NATURAL RESOURCES STRESSED

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[Article by G. Ye. Shaldina, senior engineer, center for scientific organization of labor and production management in the fish industry (Moscow): "Intensification of the Utilization of Nature and Reproduction of Resources"]

[Text] The extraction branches remove from nature elements which are organically related to it but are necessary to society. Therefore the development of the extraction branches presupposes a long-term evaluation of the condition of the resources that are being exploited. Excessive rates of consumption of resources in immediate interests can, because of depletion, lead to large economic losses in the future.

An evaluation of the natural source is especially important for branches that extract reproduced resources. Along with the strategic directions for the intensification of the development of branches that extract reproduced natural resources which are the same for all of the national economy, it seems that we should also be oriented toward the following principles:

increased extraction as a result of organized reproduction of resources;

the relationship between the resources and the environment in which they are located as inseparably connected objects;

the evaluation of the environment where the resources are located as an independent good;

maximum utilization of the usefulness of one extracted resource or another and their enlistment of previously unutilized kinds of resources in processing with the help of new technologies.

Reproduced natural resources include the fertile layer of the soil, oxygen in the atmosphere, resources of trees (wood, food, feed and medicinal) and recreation, certain kinds of water resources, biological resources of the hydrosphere (fish, invertebrates and algae). A unified approach to evaluating the directions for intensification of production in the branches that exploit such varied resources is justified by their common economic features. These

include, first, the natural reproductive capacities which condition certain limits to the removal of the resource, the violation of which leads to depletion of the supplies. Second, the inertness of the resource and the environment in which it is located, which is understood as the ability of the environment as a whole and individual components of it to compensate for external influences.<sup>1</sup> Third, each resource is a constituent part of the environment in which it is located, which includes several elements. Many of them are goods in and of themselves with various consumer qualities. For example, the hydrosphere is not only the environment of biological resources, but also of transportation routes, a place of habitation and location of mineral and organic resources which are already being assimilated and which exceed the supplies on dry land. The forest, in addition to wood, means also medicinal herbs, hunting grounds and so forth. Moreover, the environment itself is useful. Both the forests and the hydrosphere have natural conditions for man's existence, and they play a key role in the heat, oxygen and water balances of the planet. The significance of the interconnection between the resource and the environment in which it is located is determined from the economic standpoint by the fact that economic exploitation of one of the resources disturbs the natural balance of elements and processes in the section of nature. The ecological balance is disturbed and the economic potential of the section decreases.

#### The Limits of Extensive Growth

For a long time the development of the extraction branches has been oriented only toward naturally reproduced resources, mainly the most accessible and abundant ones. In fishing, for example, they utilized mainly resources of the internal bodies of water. In Russia in 1913, 80 percent of the catch came from internal salt and fresh bodies of water.

But even by the first half of the 20th century the more accessible and abundant resources were exhausted or close to depletion. In 1950 the catches in the Caspian Sea had dropped to 33 percent of the 1913 level, and in the lakes -- to 60 percent. The catch from the internal bodies of water decreased from 843,000 tons in 1913 to 709,000 in 1950.<sup>2</sup> It became clear that the natural biospheres of the internal bodies of water and their reproductive capacities cannot satisfy the growing demand both for food products and for technological raw material.

Having exhausted the possibilities of the internal bodies of water, fishing turned to the Pacific Ocean. Its fish stock, which are incommensurable with the capabilities of internal bodies of water, gave the ocean the reputation of being "inexhaustible."

In the 1950's in all countries there was a powerful offensive into the biospheres of the ocean with the help of principally new means of extraction and organization of extraction. Trawler-plants made their appearance. They are capable of processing the catch on the spot. There were also complexes which join together special fishing ships and floating processing bases in the regions of the fishing. The expedition form of fishing also made its appearance, and so forth. The field of production not only expanded, but new implements of labor also appeared, which initially led to increased efficiency

of the branch. In the fishing branch under union jurisdiction, which includes industrial ocean fishing, before the 1970's the profit and profitability rose, and expenditures per ruble of commercial output decreased. From 1950 through 1975 the catches increased 5.9-fold. The share from open bodies of water in the catches of the Minrybkhoz reached 88.5 percent.<sup>3</sup> At the same time there was a more critical need to combine the extraction of biological resources with planned work for reproducing them.

Improvement of technical equipment and technology, even with increased efficiency of extraction, does not create conditions for intensification. The development of production cannot be considered effective if it causes harm to nature which will end up in economic losses in the foreseeable future. But this tendency can be observed in the development of world fishing. During past decades efforts and investments have been directed toward the development of technical equipment and technology for extraction. The time came when there was an over-exploitation of the main industrial fishing regions of the world oceans. It became clear that the ocean was not inexhaustible. In world fishing the catches, which reached the level of 60 million tons in 1970, have not exceeded this level since, in spite of the increased tonnage of the fishing ships (from 1965 through 1975 it increased from 2.8 gross tons to 8.6 million). The quality of the resource deteriorated both in terms of the varietal composition and in terms of the consumer qualities of the traditional objects of the catch. The catches of traditional and valuable fish -- herring, mackerel, rock trout, flounder, cod, bass and hake -- have decreased. The proportion of small fish has increased. The new fishing regions are not as biologically productive as the traditional ones. More than 60 percent of the ocean's water area is now rated as less productive.

The utilization of all the poorer and remote resources is accompanied by an increase in the cost of the technical equipment. In world industrial ship building during the past 10 years the cost of ships, regardless of their size and purpose, has increased 2 to 3-fold.<sup>4</sup> The deterioration of the condition of natural resources, the remoteness of the regions and the complication of the conditions for fishing reduce the operational productivity of the technical equipment. For example, in 1981 the catch for the year per 1 horsepower of engine capacity of the fishing fleet of the USSR Minrybkhoz dropped to 70 percent as compared to 1965.

The external factors (deterioration of the condition of the raw material, the change in the regions and the conditions for extracting the resources, the increased cost of technical equipment) have brought about a reduction of the economic effectiveness of the extraction branches. From 1970 through 1980 expenditures per 1 ruble of commercial output in the fishing industry increased by 7 percent, profitability decreased by 37 percent, and capital expenditures per 1 million tons of increase in output increased 6.5-fold.<sup>5</sup>

#### It's Time for Reorientation

Reliance on the inexhaustibility of naturally reproduced natural resources and overestimation of nature's ability to restore industrially removed resources thus caused difficulties in satisfying the growing needs of the people. It became clear that exhaustion of the natural potential leads to a sharp

reduction of the economic possibilities. We have come close to the level at which the natural protective properties are no longer enough to protect nature. This does not pertain to fish resources alone. "The degree of utilization of many restorable natural resources is approaching the initial amount of their balance. Thus we are using about 70 percent of all the soil that is suitable for agricultural production with modern methods, about 50 percent of the growth of the timber supply, about 10 percent of the fresh water from rivers, and about 70 percent of the increase in the population of the main kinds of industrial fish."<sup>6</sup> In the United States alone the removal of oxygen from the atmosphere is no less than twice the amount that is produced by ground plants.<sup>7</sup> At the same time the social need for resources continues to grow. According to predictions of the VNIIPIEM-Lesprom, the demand of the world economy for timber materials will more than double by the year 2000 as compared to 1980. Soviet and foreign biologists and economists are predicting that by the year 2000 man's need for biological resources from the water will have increased to 120-130 million tons, or approximately 1.8-2-fold as compared to the present level.<sup>8</sup> Consequently, there are no prospects for effective exploitation of nature and reproducible resources just on the basis of "gratuitous" removal. Hence the economic and ecological significance of compensation for the harm that has already been caused and the prevention of further losses. This will require active technical intervention in the natural processes: the protection of resources, their purposive formation, and increased comprehensive biological productivity of natural sources, that is, the organization of simple and expanded reproduction of nature.

#### Reproduction is Effective

The economic significance of technology for the protection of nature and reproduction in the branches that withdraw reproducible resources is multifaceted. It provides, in the first place, for fuller satisfaction of the social demand, not only through natural, but also through artificially produced growth.

In the second place, the quality of the resources that are extracted improves because of selection and also as a result of the formation of the necessary properties in the environment where the resource is located. Organized reproduction makes it possible not only to restore the resource of nature, but also to improve it and adapt it to the needs of the society and to the conditions of the processing industries. For example, cultivating ahnfeltia algae simplifies and reduces the cost of the process of obtaining agar, since natural ahnfeltia contains more than 50 percent impurities, whose removal is very labor-intensive. The technology for cultivating mussels raised on sea farms is much simpler than it is with natural mollusks, since they do not have any foreign inclusions. Moreover, cultivated mussels produce 1.5 times more meat than "wild" ones do.

In the third place, purposive formation of the resource and the environment in which it lives during the process of artificial reproduction simplifies the technology for extraction. Natural algae in the coastal waters of our country are difficult to get at for industry and they are sparse, while in artificial structures which are located in convenient places the raw mass reaches 50-60

tons per hectare, that is, twice as much as in natural growing areas. The efficiency of extraction increases correspondingly.

In the fourth place, outlays per unit of demand are reduced as a result of the reduced cost of reproduction work for forming the resource with artificial materials to replace natural ones.

In the fifth place, with an increased amount of production there is an economic effect from concentration as a result of the fact that the systems of production capacities of extraction enterprises include elements of reproduction of natural resources. An example of purposive formation of natural resources and the sphere of their habitation is the development of crop growing and animal husbandry. In the current stage they can form and control technologically not only the properties of agricultural products, but also the basic properties of the land, its productivity and the conditions for raising livestock, that is, the habitat.

The effectiveness of artificial reproduction in agriculture is apparent when one compares the land and the ocean. Only 12 percent of the intensively cultivated surface of the globe produces 99 percent of the food products, and 71 percent of the <sup>9</sup> surface, which is occupied by the waters of the ocean, produces 1 percent.

The reproduction of resources is not only economically, but also ecologically significant because of the fact that many resources play a life-sustaining role. So far the society is incapable of fulfilling the "duties" of the forests completely or efficiently enough and, consequently, expenditures must be made for artificial reproduction of timber resources. The significance of the reproduction of a natural source is not so great economically as it is in the role of the natural condition for the existence of a human society. Thus the development of technology and technical equipment for the reproduction of resources is a necessary alternative to increasing production capacities which extract naturally reproduced resources.

Activation of the management of reproduced resources is proceeding in two directions: increasing the productivity of the natural environment of the resources (cutting down old trees, fertilizing the soil, fighting against pests and diseases of trees, incubating young fish and placing them in natural bodies of water, fighting against pollution, building artificial spawning places, and so forth) and commercial cultivation. In fishing the first direction is represented mainly by placing young fish (mainly salmon and sturgeon) in bodies of fresh and salt water. The world catch of sturgeon is increasing mainly because of our country, where the main sturgeon basin is the Caspian Sea (90 percent of the catch). With an overall decrease in the catches in the Caspian Sea during 1975-1980 from 345,200 to 315,000 tons, the catches of sturgeon increased by more than 2,000 tons.<sup>10</sup> Because of the work of the sturgeon farms, the catches are increasing in spite of the complete or partial loss of the fish spawning beds.

Farm propagation of salmon has become widespread mainly in the Far East. Each year about 1 billion young salmon are placed in the rivers. Even with a 1-2 percent industrial return, the products are valued at 120 million rubles.

But still this effective direction of scientific and technical progress is much less dynamic than the traditional extraction of natural resources. It is difficult to expect success in the reproduction of the water biospheres when the investments are insignificant.

Many fishery enterprises, for example, the fisheries of Sakhalin and the Baltic area, maintain a low level of mechanization and inefficient technological processes.<sup>11</sup> They typically have weak economic and organizational connections among enterprises that reproduce and extract the same resources.

The second direction of intensive exploitation of water resources is commercial fishing. It is represented by commercial pond and lake fisheries and cultivation of sturgeon in the Azov and Black Sea basin and salmon in the Baltic, as well as small experimental industrial farms for raising invertebrates and algae in sea water. Pond fish breeding is the most developed area of commercial raising of fish. More than 90 percent of the 200,000 tons of fish obtained from bodies of fresh water comes from ponds. Sea fishing is insignificant -- 450-700 tons of salmon and sturgeon which are raised in fisheries. It is necessary to recognize the importance of commercial fishing. But so far the low level of technology in the majority of fisheries does not ensure a guaranteed yield of fish per 1 hectare. The average annual increase in the output of fish per hectare of ponds is not great: 0.2-0.3 quintals. The level of mechanization of the production processes is 20-30 percent. The need for fish planting material is being satisfied by 60-70 percent.

The development of domestic cultivation in water and, particularly in the seas, is lagging behind the potential natural possibilities. Just in keeping with the peculiarities of the coastal waters, 38,000 - 40,000 square kilometers of the coastal zone are suitable for creating sea farms. The potential output from these regions is estimated at 1 - 1.25 million tons of algae, invertebrates and fish.<sup>12</sup> But the industry is making little use of the scientific developments that have already been completed.

In world fishing, cultivation in water areas has been developing at especially rapid rates since the beginning of the 1970's. It is no accident that this coincides with the stabilization of world ocean catches. In 1980 the production of water crops reached 9 million tons, with a prevalence of products from sea farms.

Among the industrially developed countries, Japan has achieved marked success in cultivation in water and sea fish propagation.

As a result, products from water culture increased from 53,000 tons in 1950 to 1 million tons in 1978. The practice of fish farming in Japan confirms that the changeover from exploitation of natural resources to their expedient formation and cultivation in convenient regions and under convenient conditions is becoming a decisive area for intensification.

Until recently, ocean fishing has developed with "resources that belong to nobody," as distinct from other resources that are located on the territory of one state or another and consequently belong to it. It has been typical of the past decade to have active expansion by the states of the coastal water areas to which their national jurisdiction extends. About 100 states have now declared ownership of 200-mile fishing, economic and other zones, this covering about 38 percent of the water area (the most productive regions) of the world ocean for free assimilation of the biological resources. Many countries with developed expedition fishing have reduced their catches because of this.

### Strategy of Intensification

And so the reproducibility of resources determines the strategy for the development of branches that exploit them. An essential feature that is common to all branches that extract reproduced resources consists in the close connection between the resource and the environment in which it is located. The removal of one of these resources has an effect on the quantitative and qualitative characteristics or possibilities of assimilation of other resources of the section. Various characteristics (consumer qualities, conditions for occurrence or habitation of resources) presuppose different economic, technical and organizational measures for exploitation of individual resources of the region. Therefore intensification as a means of increasing the effectiveness of production is oriented toward the extraction not of an individual resources, but a complex of resources of one section of the natural environment or another. The comprehensiveness of the assimilation of the environment along with the reproduction of resources is a decisive area for the exploitation of reproducible resources.

With comprehensive assimilation of the environment it is possible to have conflicting situations in which some resource or useful quality is "sacrificed." There is an example of this in the timber industry -- using wood predominantly as technological raw material and ignoring the role of vegetation in maintaining the oxygen balance. With an unchanged speed of cutting (20 hectares per minute), which exceeds the growth of trees 18-fold, man will soon approach the critical level when it will be necessary to grow trees for "oxygen."<sup>13</sup> Active reproduction of the resources and the environment where they are located as an intensive direction for management resolves these conflicting situations.

The same situation is possible with the assimilation of the resources of the world ocean. The high level of extraction of natural resources on dry land has led not only to a reduction of its effectiveness, but also to a future in which the extraction of some of these will have to be curtailed. There is a natural reorientation toward the extremely significant supplies of mineral resources in the ocean. With active exploitation of these the extraction of biological resources will end up to be difficult or impossible. This is precisely why one of the directions for world fishery science and practice is the creation of effective industrial installations for cultivating biological resources under conditions of complete control over the habitat and the life cycle.

Another, no less important direction for intensification is comprehensive utilization of the resources and the extraction of all the useful components from the initial raw material and processed materials. Comprehensiveness of the utilization of natural elements is inherent not only in the processing branches, but also in the extraction branches. Comprehensiveness means primarily the spreading of waste-free technologies. Extraction should also be oriented toward becoming waste-free.

Comprehensiveness also presupposes processing of resources that were not used previously or their use was limited. In fishing poisonous fish are suitable for obtaining biologically active substances, a use is being found for plankton, and in forestry, deciduous and small trees are being processed. The general demands being placed on the processing branch is to utilize the components of a given resource completely, to bring initial processing of the raw material close to the place and time of their extraction, and to combine the extraction industry and several processing industries.

Thus expansion of the system of production capacities of extraction industries as a result of including elements that provide for reproduction of the resources and initial processing of the extracted raw material is becoming a condition for increasing their effectiveness. Combining reproduction and extraction provides for balance of production capacities, which are intended not simply for removal of resources from nature, but for their reproduction and, in the final analysis, the acquisition of the raw and initial processed materials which are needed by the society.

Such a modification of the goal brings about a new view of the concentration of production in the branches that extract reproducible resources. The enterprises of these branches cannot be expanded just through increasing the extraction of natural resources. The growth of production and its intensification are only possible with an interaction of the elements of the system "reproduction -- extraction -- initial processing" in a unified economic complex, whose common goal determines the direction of the development of each individual unit.

It seems that the solution to the problem of satisfying the needs of the society for natural resources and the limited possibilities of reproducing them presupposes the following conditions:

awareness of the fact that nature is not inexhaustible, even if individual elements of it are capable of reproducing themselves;

an increased proportion of expenditures on scientific developments and their introduction at enterprises for the protection and reproduction of resources;

streamlining of the production structure of extraction branches through reproduction of resources and comprehensive processing of them at the place of extraction;

improvement of the organisational structure with a combination of the exploitation and reproduction of resources into a single economic subdivision;

improvement of planning and incentives in the interests of efficient utilization of nature;

expanded reproduction of resources and, on the basis of this, further concentration both of extraction and of initial processing of raw material;

exploitation of resources of a region without exhausting them, that is, continuous, efficient utilization of resources.

The economic-ecological approach to evaluating the assimilation of natural resources is a condition for the selection of directions for intensification in branches that extract reproducible resources.

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## ROLE PLAYED BY ECOLOGY IN OPERATION OF ENTERPRISE DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 159-168

[Article by L. G. Mel'nik, candidate of economic sciences, branch of the Kharkov Polytechnical Institute (Sumy): "The Ecological Component in the Life of the Enterprise]

[Text] Society is being compelled to make increasingly significant expenditures because of pollution of the environment. An appreciable part of the profit of the enterprises and the income to the society go to cover these expenditures. The majority of economic decisions that are made require special economic substantiation, and the most economical is selected from a multitude of possible variants. The necessary expenditures are compared with the economic results.

But it must be stated that a considerable part of the outlays of public production have remained beyond the field of vision of the economists. It is just as though we were judging the size of an iceberg from its visible tip, forgetting about the part that lies under the water.

What is the "underwater part" of socially necessary expenditures? And where is it formed?

What is the Harm from Smoke?

Although practically waste-free productions exist, in theory there is no such thing as a waste-free process. Most of production is characterized by considerably wastes. In particular, according to certain calculations, only 1-1.5 percent of the natural substance used in production is transformed into the final product, and the remaining 98.5-99 percent constitutes waste,<sup>1</sup> which is discharged in greater or lesser quantities into the soil, water or air.

Society's outlays up to this point have been relatively well studied and taken into account. They include expenditures on extraction and processing of the initial raw material and all stages of product manufacture. They also take into account the outlays of the enterprises in order to get rid of the wastes from their own production. The wastes that are discharged, when they mix with one another, begin their independent path, now ignored and uncontrolled.

Theoretically, the damage from economic activity exists to the extent that public production exists. It has not been appreciable until recent decades. In the first place, the scope of pollution has increased and, consequently, also the amount of damage. In the second place, the value of a unit of any resource is increasing so that losses of them cost more and more. In the third place, ordinary production expenditures per unit of output are decreasing. Under these conditions the amount of ecological damage becomes commensurable with the direct production expenditures.

Damage caused by smoke was registered for the first time by the Mellon Institute in the United States in 1911-1913. In Pittsburgh, for example, it was determined in the amount of 8.5 million dollars per year. In 1950-1951 throughout the entire territory of the United States losses from pollution of the environmental air were determined in the amount of 1.5 billion dollars per year, and by 1968 they had reached 6.1 billion dollars. And this figure accounted only for the damage to purely material values. At approximately the same time work was started to estimate the damage in other countries: Great Britain, Italy, France, the FRG, Czechoslovakia and Japan. In particular, in Italy attempts are being made to estimate the damage cause by atmospheric pollution to the country's artistic values (archaeological treasures, monuments, works of art and books in the archives). While it barely reached 1 percent of the gross national product of the leading capitalist countries in the 1950's, in Poland the damage exceeded 10 percent during the past decade. These facts were taken from the book by Prof O. F. Balatskiy, under whose leadership in 1969 our country began work on estimating the economic damage from pollution of the atmosphere.<sup>2</sup>

#### The Sum of the Damages

Pollution of the environment in which we live, naturally, causes increased expenditures on treatment and prevention of diseases. To this we must add direct losses of working time (workers' absences from work because of illness). The additional expenditures because of intensive wear and tear on fixed capital in industry and municipal and housing services, a reduction of the production potential of agriculture and forestry -- this is still not all of the sum of negative consequences and necessary withdrawal of labor force to eliminate or compensate for the consequences of pollution.

Thus the sum of the ecological harm to the national economy is expressed in the form of actual and possible losses resulting from pollution of the environment. Thus we either lose part of the agricultural products as a result of the harmful effects of pollutants or these losses will be made up for at the price of additional expenditures on fertilizer and intensification of farming. Under the influence of aggressive pollutants, the service life of fixed capital in industry decreases, but it can be brought close to the norm as a result of expenditures on additional repair work.

But we do not always manage to compensate completely for the negative consequences of pollution. For example, a smaller quantity of products or products of inferior quality are taken from each unit of area, and the expenditures on their production are greater.

In the overall damage, say, from pollution of the atmosphere, one can clearly trace the constituent parts, which have come to be called local damage, and its average structure: damage from deterioration of the health of the population -- 44-45 percent, damage to housing and municipal services -- 33-34 percent, damage to agriculture and forestry -- 10-12 percent, and damage to industry -- 12-10 percent.

Study under the "economic microscope" makes it possible to assert that the ecological damage is formed under the influence of three main factors: the level of pollution of the environment, the number of objects which receive the pollution, and the normative economic indicators which place values on the natural negative changes in the society and nature.

#### How to Make the Simplest Calculation

It is possible to single out a region where the pollution level exceeds the norm with the help of a chemical analysis of the pollutants or by calculation. The gross discharges of harmful substances and the technical parameters of the source of pollution (height of the pipe, speed of the gas at exit) and also an entire system of meteorological information and special computer programs help to single out the zones of concentration of harmful substances within which a polluted zone is located. Successful work for creating these programs is being conducted by the Main Geophysical Observatory imeni A. I. Voyeykov and the Computer Center of the Siberian Branch of the USSR Academy of Sciences. And, of course, it is necessary to have a large number of observations in order to be sure that correlations are not random, but stable and repeated.

The initial estimate of the economic damage from pollution which will serve as a basis for further calculations is very labor-intensive and requires gathering a considerable quantity of information and also computer equipment.

What can be done? After all, the estimate of the damage should be available to a large group of economists and specialists of planning institutes, enterprises and branches. There is the so-called empirical method. One can say with a great degree of probability what harm will be caused to each conventional unit (1,000 people or hectares of agricultural land or forest, fixed capital worth 1 million rubles which is in the polluted zone). These estimates are called proportional damage and, as a rule, they are calculated with respect to each individual local kind of damage. Now, if we know the concentration of harmful substances in the polluted zone (city, region), it is sufficient to multiply the proportional damage by the conventional units located in the zone. This method is called the method of concentration. Several methods like these were developed by the Sumy branch of the Kharkov Polytechnical Institute for thermal energy enterprises and enterprises of the aluminum industry.

The methods involving concentrations provide for relatively high precision of the results, but the labor-intensiveness of the calculations is still great: it is necessary to have means of measuring the concentrations or computer equipment with the corresponding programs. Only large organizations or an entire system of city services are capable of this.

What should be done if the damage is to be estimated by only one or two plant specialists? Can the significance of the damage not be "deduced" directly from the volumes of harmful substances that are discharged by the enterprise? They are well known. True, the damage is caused precisely by concentrations. It is "an immense distance" from the discharge from a pipe of a specific enterprise to the concentration of substances at any point in the adjacent region. In addition to the volumes of substances that are discharged, a whole number of interconnected factors participate in the formation of the concentration: the direction and speed of the wind, the temperature characteristics, the relief of the area and, finally, a whole number of peculiarities of the source of pollution itself, the most important of which is the height of the pipe, which is capable of spreading smoke discharges over several kilometers.

But still it is possible to find a way out. For example, one can introduce a certain differential of proportional damages. By drawing conventional concentric areas around the source of pollution and assuming that with an increase in their radius the concentration will decrease, we can calculate the proportional damage in each zone caused by each ton of discharged ingredients. The precision of the calculation can be increased if we correct our conventional zones according to the real wind rose and introduce corrective coefficients which take into account the height of the pipe and the capacity (in terms of discharges) of the source of pollution. In this case the precision of the results will approach the precision of calculations made according to the method of concentrations, and the task is significantly simplified. But still this requires the efforts of knowledgeable specialists.

For calculations that do not require a great deal of precision, the TsEMI [Central Economics and Mathematics Institute] of the USSR Academy of Sciences has suggested a method whereby the values of the complex amount of damage are given in terms of the mass of the discharges (in tons). And the individual peculiarities of the calculation -- toxicity of the ingredients, height of the pipe, climatic peculiarities, the infrastructure of the adjacent region -- are adjusted with the help of special coefficients.<sup>3</sup>

Table 1. Values of Proportional Damage Caused to the Municipal Economy, 1,000 tons of dust per year

	Zones						
	1	2	3	4	5	6	7
Radius of zone, km	1.0	1.8	3.0	5.0	7.5	11.0	15.0
Damage, ruble/ 1,000 people (objects necessary for habitation of 1,000 people)	450	280	170	105	70	40	16

## The Damage Is Determined. What Next?

Scientific and technical progress is offering more and more new materials to production. Expenditures on their production are comparable, and they usually begin with expenditures. Yet the ecological purity of the production of various materials and, consequently, the damage is frequently much different.

The goal is clear -- to reduce the negative effects of production processes on the environment, man and society. Eminent economics scholars of the country have recognized in their works the possibility and expediency of introducing the amount of economic damage in business calculations (N. P. Fedorenko, T. S. Khachaturov, O. F. Balatskiy, M. A. Vilenskiy, K. G. Gofman, V. N. Leksin, M. Ya. Lemeshov, P. G. Oldak and others). Having revealed this damage, it is possible to try to reduce it. What are the main directions through which it is possible to move toward this goal today?

**Distribution of productive forces.** The drawing up of the current five-year plan is preceded by the development of a prediction of the economic harm from pollution of the atmosphere in more than 110 industrial centers of the country during a 15-year period. A preliminary disclosure of the "hot spots" has made it possible to reduce beforehand the load on the ecological potential in places where it has approached the critical level. At the same time environmental protection measures are envisioned for these points.

**Optimization of planning decisions.** Variants of industrial and urban building and the location of transportation main lines and recreational facilities are selected. In particular, as research has shown, moving one of the chemical combines of the Ukraine to 5 kilometers outside the city reduced the economic damage to one-third to one-tenth the previous level.

**Optimization of capital investments for ecological purposes.** Two metallurgical combines in Zhdanov invested about 25 million rubles in purification installations over 10 years, and each year they pay operational expenditures of 6 million rubles. These funds have already been fully recouped. But, as calculations have shown, some redistribution of capital investments at these enterprises could have significantly increased the economic effectiveness of the invested funds.

**The establishment of the optimum of ecological expenditures.** Recently in the practice of ecological activity the term temporarily coordinated discharges (VSV) has come to be widely used. As we know, the less money we spend on environmental protection, all other factors being equal, the higher the level of pollution. And the amount of damage also begins to increase. One should obviously consider the economically optimal level of expenditures to be the one whereby the sum of expenditures and damage are minimal. This is the method used to calculate the temporarily coordinated discharges of enterprises in Bratsk, Volgograd, Volkov, Irkutsk, Krasnoyarsk and Tikhvin.

**Alternative variants of the development of production.** In keeping with the standard methodology for determining the economic effectiveness of new technical equipment, it is necessary to compare various variants in terms of the level of their effect on the environment. For example, calculations at

the Sredneuralskiy copper smelting plant showed that the variant of production of blister copper with the utilization of an autogenic process, which provides for maximum recovery of sulfur-containing gases, is more effective than reflection smelting. The annual economic effect amounts to 13.7 million rubles, and about 4 million rubles of this sum is gained as a result of reducing the economic harm.

Table 2. Rough Values of Economic Damage to the Environment

Production of material resources, rubles/ton	
Steel	4-17
Copper	60-100
Aluminum	15-20
Cement	1-3
Chemical fibers	20-25
Production of electric energy at thermal electric power stations, kopecks/kilowatt-hour	
	0.2-0.3
Creation of fixed capital, thousands of rubles of damage/million rubles' worth of fixed capital	
In thermal energy engineering	15-20
In ferrous metallurgy	30-50
Shipment of cargo, rubles/thousand ton-kilometers	
Automotive transportation	1-2
Rail transportation	0.03-0.04
Discharges of harmful substances, rubles/ton	
Dust	120-180
Sulfur anhydride	135-200
Nitrogen oxide	200-300
Carbon monoxide	70-100
Hydrocarbon	180-270

Improvement of cost accounting (khozraschet). Environmental protection activity of the enterprises is advantageous for the national economy, but so far it has not been given the proper stimulating indicators in the khozraschet system. And the basic effect from these measures is realized not so much in the enterprises themselves as in the associated subdivisions of the national economy. Hence the low motivation of the enterprises for ecological activity. But if one were to "legitimize" the amount of prevented damage, place it on a par with other economic effects, having made it a fund-forming indicator in the system of material incentives ... One could also use for these purposes the indicator of the "average damage from output." Or one could take another path by introducing, as certain economists suggest, payment for pollution. But from our standpoint it should be based on concrete values of kinds of damage inherent in a specific region. All this will undoubtedly cause additional problems, but their solution is a step in the direction of making what is advantageous for the national economy advantageous for every enterprise as well. And the averaged estimate of the damages, on which they

frequently rely in the regions and at the enterprises, as a rule, are expedient for solving problems at the national economic level.

The selection of a strategy for the development of technologies. Here one should take into account not only the direct expenditures, but also the total values of the damages in the stage of production of materials, the total values of damages in the stage of production of the electric energy necessary for the given technology, and, finally, the total values of the damage cause by the harmful discharges during the course of the technology itself. Naturally, all of the aforementioned estimates should be made commensurable in terms of the time of the action and the stages of participation in the production cycle. When evaluating the effectiveness of changing over to hydrogen fuel for internal combustion engines, it is necessary to take into account also the economic damage related to the operation of gasoline engines, the damage during extraction and processing of the fuel, the damage caused by automotive transportation, and so forth. On the other hand, one must take into account the economic damage caused during the production of the electric power necessary for obtaining hydrogen. The same thing is true when evaluating the prospects for electric cars: for they will cause economic damage related to the production of batteries. Only such calculations can give an answer as to whether an innovation is suitable or whether it is better to keep gasoline or diesel engines.

Selection of design materials. Here too we see mainly an orientation toward direct expenditures on their manufacture. But if one were to take into account the amount of damage caused by obtaining the materials we would hardly see the same aluminum or nonrusting steel chairs that have replaced wooden ones.

Evaluation of the effectiveness of salvaging wastes and economizing on resources. One can say boldly that the lack of such an evaluation impedes the introduction of the majority of technological process for salvaging wastes. In the United States in the 1970's only 1 percent of the secondary raw material from wastes was processed, since it was cheaper to use the initial raw material. But if one takes into account the ecological indicators, the salvaging of secondary resources can compete fully with the basic production. For this is a process of almost absolutely "pure" reproduction of resources.

Obviously, sometimes when materials, technologies or plans are made less expensive they conceal a large amount of damage that is caused to the national economy. Will such "incommensurability" become the object of constant analysis at the level of the enterprise? So far we do not have the proper answer to this question in practical economic activity.

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## PRACTICE OF BRIGADE LABOR METHODS DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 169-185

[Article by I. M. Starikov, candidate of pedagogical sciences, division chief of the center for scientific division of labor (Nikolayev): "Notes on Brigade Labor Methods"]

[Text] Years have passed, but memories left from visiting the Kaluga turbine plant and learning about the comprehensive brigades of machine tool operators working under a single contract are still fresh in my memory. I was impressed not by the production successes and achievements of the Kaluga workers, but by the attractiveness of the ideas of collective labor and their serious, respectful attitude toward all the measures.

As is always the case when something significant is encountered, after my business trip to Kaluga I was left with a mixed feeling of joy and ... sorrow. The former was from the fact that the meeting had taken place, and the latter -- because of what was lost and missed: why did I not take this trip before?

The good and necessary work did not remain unnoticed. There came to be more and more published works on this subject. There was a lot of discussion of brigades everywhere. And then one time I came across a new word -- "brigadization." For some reason it was irritating. Primarily because there was something dead sounding about it, like "mechanization" or "automation." It did not seem appropriate to the very different faces of the brigade leaders, each interesting because of his individuality and uniqueness, with whom I had occasion to speak in Kaluga. I recalled the discussion of A. V. Razumov, the former deputy director for production and economics of the KTZ, one of the ideologists and initiators of the brigade method of labor, about how carefully they had selected the candidates for advancement to positions of leaders of the first labor collectives at the plant. And there was a remarkable detail. The plant director at that time, L. V. Pruss, under whose leadership they changed over to brigade methods of labor, already being the deputy minister, recalled not only the surnames, but also the first names and patronymics of many of the brigade leaders of Turbinka.

Such an uninspired term was attached to this vital cause which demands constant sensitivity and sincerity. Perhaps with time, like any trivial

thing, this unfortunate neologism will also be forgotten. Enough of then have been originated and died with the development of production!

The decree of the CPSU Central Committee, "On Further Development and Increased Effectiveness of the Brigade Form of Organization and Stimulation of Labor in Industry" (December 1983) emphasizes: "In a number of branches the creation of brigades is merely formal, befitting a one-time campaign."

At one of the large Leningrad plants of an associated branch we became familiar with the condition of the training and production base. We were shown small, but comfortable class rooms with attractive, oak-finished plastic desks and benches. And in the work positions of the instructors were slide projectors. In one of the classrooms they even demonstrated an original machine for programming the testing of knowledge. One felt that here they not only know how to conduct classes, but they have also mastered modern pedagogical equipment and the training is interesting and productive.

Business continued until the end of the working day and I wondered whether classes would be held today. "They are already in progress," answered the worker from the technical training division who was accompanying us, "at 4 p.m. they begin the scheduled training for brigade leaders. It is just that they are not here; they are studying in the shop." We went down to the floor below. A door with the sign "Rest area for shop No 5" opened slightly. There were no less than 60 people in the room. But there were no desks here. It was as though the instructor were drowning in a podium which covered him up to his throat. A couple of workers were sitting there in their work clothes, canvas overalls. Nobody had a tablet or a notebook in his hands. Our eyes were caught by the sleepily bowed heads of the listeners.

To my question of why the class was being held here and in such large groups they answered: on instructions. Before the creation of the new brigades it was necessary to train their leaders in courses. In keeping with the established assignment, this year many more brigades will appear at the plant. There are not enough teachers or large classrooms. And our companion concluded fairly confidently: "The plan for brigadization will not fail because of this"! ...

#### Poetry and Prose About Brigade Methods

I calculated the number of articles about the brigade method in central newspapers and leading economics journals which had appeared during the past 5 years: they increased on an average of 10-fold in the newspapers and almost 6-fold in the technical and economic journals. In such cases it is common to speak of an "explosion," and an explosion means a most serious change in the traditional ideas and concepts in the given branch of knowledge. Trying to establish what these changes are, I read through the typical headings of articles and selections in the newspapers: "The Potential of the Brigade," "Success Originates in the Brigade," "The Effectiveness of Collectivism," "The Path to the Record," "You Will Find it in the Brigades." A boldly festive tone, inherent in the majority of published articles, pervades all the published articles. L. V. Pruss has referred to this repeatedly. In the

majority of cases, what is written about new brigades, in his figurative terms, is like "verses in the clouds."

I am sure that the authors did not distort the figures or embellish the facts. But when one reads such materials common sense rebels and suggests a simple question: if the advantages of brigades are so obvious, how do they explain the shortcomings in their dissemination, and why is the increase in labor productivity resulting from their introduction so low?

Looking through the literature on scientific organization of labor, I was stumbled across this assertion: "Careful analysis revealed the fact that in cases where the workers are joined together in workers' cooperatives, each of them individually becomes much less productive than they are when they are motivated by self-interest. When working in large collectives, the individual productivity of each individual inevitably drops to the level of the worst worker in the collective or even below this level, and thus each worker, as a result of joining a collective, lowers his level instead of raising it."

These are the words of F. U. Taylor. As we can see, the founder of scientific organization of management firmly believes that in brigades the workers will always strive to do as little as possible. But at the VAZ and in Kaluga they assert and, more important, have proved the opposite: workers joined together into brigades at a socialist enterprise can and do strive to work more efficiently than they do when they are alone. In essence the dispute is about ways of increasing labor productivity under modern conditions. Such are the profound issues that are touched upon here.

It is no accident that one can hear from the Kaluga workers and their followers that the changeover to collective forms of organization and payment for labor means more than just a complex of preparatory measures of an organizational, technical and economic nature. To no less a degree, it is also a new psychology. Therefore one is wary of light cursive writing about brigade affairs. One has a keen sense of the need for serious analysis of those problems which the brigades bring with them. The decree of the CPSU Central Committee (December 1983) discusses the inadmissibility of underestimating the moral and psychological factors.

#### Pedagogy of Brigade Labor

The brigade teaches people to work well. The brigade is the collective educator of young workers. One frequently encounters conclusions like these in articles and other published materials. But it seems that this is not all there is to the pedagogy of brigade labor. For is a real pedagogue not learning himself every day and in each class? Do the students really simply absorb the information that is given to them and give nothing to their teacher in return? Who knows, perhaps it is in the ability to constantly learn from one's students that the mystery of the pedagogical art lies?

Once, as part of an interdepartmental commission which analyzed the condition of the work for training brigade leaders, I participated in an inspection of the Kaluga Turbine Plant. Looking over the plant provisions concerning the policy for conducting classes in courses for brigade leaders, one of the

members of the commission who represented a higher organization drew our attention to this: as distinct from the recently approved unionwide provisions and the branch provisions that correspond to it, the Kaluga workers complete the training of brigade leaders with examinations and not smaller tests. He said that such arbitrariness is a departure from the normative document and it must necessarily be reflected in the report of shortcomings. Other members of the commission, along with the chief of the plant division for technical training, began to convince him that this deviation is directed toward increasing the effectiveness of the training and it was illogical to include it as an omission.

I myself had been responsible for the development of the branch provisions to which this representative was now referring, I was well aware of the plant material on brigade labor methods and, to be honest, I had waivered for a long time as to how best to complete the training in courses for brigade leaders -- with the small which were envisioned by the unionwide provisions, or, taking the experience of the Kaluga workers into account, with examinations. When making the decision, my thinking was approximately this: this is hardly the time to give an unsatisfactory rating to a brigade leader who has gone through the classes in the courses. Therefore, in order for the examinations not to become another formality, it would be better to end the courses with small tests. And it was never quite understandable to me why such an experienced division chief as A. S. Tsukanov, a specialist who was always enthusiastic about his work, who had been in charge of the plants technical training division for many years, did not take advantage of the opportunity to avoid unnecessary formalities in conducting examinations. When reviewing the plant documents, he left everything as it had been. And to my question he answered that the workers themselves had voted in favor of examinations at the plant council of brigade leaders.

The program for the inspection envisioned visiting the shops of the plant and talking with brigade leaders who had taken training in the courses. We met with one of them, the manager of a comprehensive brigade of carousel operators, A. N. Petukhov, at the end of the shift. In a clean blue uniform, a student notebook rolled up like a pipe sticking out of one of the pockets, he looked more like a master than a worker. His friendly smile invited conversation, and he was asked many questions. He was asked about the work of the brigade, about how they distributed earnings, about which occupations they combine, and what the training in courses provided for him. He answered all our questions in detail, finding clear examples and convincing conclusions.

"And in your opinion, how is it best to conclude the training in courses for brigade leaders: with an examination or a small test?" -- I asked the worker the question that was bothering me.

He turned to me: "We discussed this among ourselves. At that time everyone," and he listed several names of brigade leaders who were known in the plant, "said correctly that examinations are better. The smaller tests, of course, are simpler, and they are not as much trouble for us workers. But, for example, I have a daughter. When she comes home after class or examinations the first thing I ask her is: what grade did you bring me? If it is an A or a B, we are both happy. When I complete training she is sure to ask me: what

grade did you receive, father? Of course I understand that I will always get at least a C if I just attend class. So I am not very comfortable going home with that grade. Now I am attending a course for sling operators so that I can master a second occupation. I know that there will be examinations, so," -- he took the rolled-up notebook from his pocket and showed it to us -- "all the questions from the tickets were written down beforehand and my comrades and I work on them together over dinner. They do not want to receive C's either."

He paused for a moment and looked at the members of the commission who were clustered around him. Something tender and mischievous sparkled in the eyes of the brigade leader, and he added: "Well, and all of our boys are in favor of examinations because they have already become accustomed to working in terms of the final result, and in tests without grades it is as though there were no final result."

The entire commission smiled, and I thought that if I had a chance to revise the branch provisions, there was no doubt that they should be made to following the Kaluga example. The decree of the CPSU Central Committee and the AUCCTU, "On Measures for Further Development and Increased Effectiveness of the Brigade Form of Organization and Stimulation of Labor in Industry" (December 1983) indicates a new level of training -- the training of brigade leaders to be engineers and technician-organizers. The pedagogy of brigade labor should be further developed.

I can imagine a picture: a five-year plan passes and the state statistical report on the appropriate form registers that highly skilled brigade leaders are in charge of the collectives at all enterprises.

#### Facts and Figures

I have had occasion to hear conclusions in favor of brigades from many specialists, foremen and workers. Therefore, frankly, I was confused when I first came across a different point of view. This happened unexpectedly, and certainly not under production conditions.

The water pipes were leaking in our building. We were told that the it would be necessary to replace the stand pipe that passed through nine floors. The residents themselves in their own apartments were to make a hole in the concrete covering of the floor so as to free the stand pipe, and only after that would the workmen begin to change them. It was not very logical, but what could be done! On Saturday from above and below one could hear pounding: the neighbors had begun to chisel the holes. The pipes went through right in the corners and it was difficult to get at them, but I found a bent crow bar and a small hammer and set to work. The hammer turned out to be too small, and it easily bounced off the large crow bar. I decided to go up and see my neighbor and see how he was doing. He worked as a lathe operator in a brick plant not far from the building.

Things had gone more successfully for him. True, he had made his hole with an awkward chisel, but he had also pounded on it with a heavy sledge hammer. I showed him my crow bar, and he suggested joining forces. Now the work went

more easily. I held the crow bar and my neighbor hit it with his sledge hammer. Within an hour the holes both in my apartment and in my neighbor's were ready. We went out into the stair well to gather up the dust and rest. Pounding could still be heard on all the floors both above and below.

"That is what a brigade is," I smiled.

My neighbor took out a cigarette.

"Do they not create brigades where you work?" I wanted to know.

"Yes, we have begun that too," he answered somehow indifferently. "yesterday the management found all kinds of ways to persuade us to join together."

"And you did not agree?" I was surprised.

"Why do I need that? I make fairly good money, and we know how they do things in a brigade: one works for all, and all work as one," my neighbor changed the well-known expression around a little bit.

"Well, why is it that way," I replied. "There is a technical control office and it is possible to calculate the contribution of each. And, in my opinion, the brigade is advantageous to everyone. Just take us, for example. Our joint result is that we have a hole in the floor, but they --" I nodded in the direction of the neighboring doors, from behind which the pounding could still be heard, "and they will still be pounding when evening arrives."

"That's right," my neighbor grinned, "we have the same result, but you held the crow bar while I did the hammering ..."

This conversation would have stayed in my memory as a curiosity, but recently sociologists have provided us with some alarming figures. They have studied psycho-economic changes that take place in production collectives where they have begun to introduce brigade forms of organization and payment for labor.

They questioned several thousand workers, brigade managers, foremen, specialists of engineering and technical services and shop chiefs of enterprises in two cities which are located in different regions of the country -- Nikolayev and Yaroslavl. The questionnaire included the question of who has most to gain from changing over to brigade methods of labor. It turned out that an average of 21 percent of the workers and 24 percent of the brigade leaders think that they have more to gain from this than others do. At the same time, 35 percent of the workers assume that the foremen have most to gain from this innovation, and 39 percent of the brigade leaders are convinced that it is the shop chiefs who have most to gain.

Perhaps the workers have not figured out or have mistakenly evaluated the existing situation? But then why do the majority -- from 25 to 91 percent of the line managers and engineering and technical personnel of the enterprise who were questioned -- think that it is they who have most to gain from the creation of brigades? It turned out that only 14 percent of the foremen had come to the conclusion, on the basis of work experience under the new

conditions, that the workers themselves had the more to gain than others. These figures are alarming because they do not square very well with what has taken place with the Kaluga workers.

A. S. Tsukanov discussed a policy that has become established with them: the next day after completing studies in courses for brigade leaders the entire group goes to Moscow to the Exhibition of the Achievements of the USSR National Economy. One time the brigade leaders learned that at one of the Moscow plants in the mechanics shops they had installed some new machine tools, and these brigade leaders wanted to learn more about them. Tsukanov called the plant, but his request was refused. He had to call the director. He received the permission. They took them through the shops and showed them the new equipment, and when they found out that it was from Turbinka, they spent a long time asking questions about the brigades, earnings and the work of the brigade councils.

A couple of days later the director of this plant called Kaluga and began to thank his colleague for his help.

"What help?" the colleague did not understand. "All they did was come to visit you one day."

"That is what we thought too, that they had just come to visit, but here is what happened."

And he related what he was talking about. It turned out that for several months they had been trying to convince the machine tool workers of the advantages of brigade labor. But they did not receive one application. But the guests discussed their work in such a way that now there are applications all over the place.

If the Kaluga workers had had doubts about the possibilities of brigade labor and had not felt its advantages they probably would not have been able to impress others with their undertaking so easily.

It seems that in general the brigade begins above all with a complete and clear awareness on everyone's part of those concrete advantages which they will receive in this primary labor collective. And not some time in the future, but beginning with the first months of work under the new policy. If it is any other way, discreditation of brigade labor is inevitable.

Thus the unexpected data found by the sociologists causes one to think. What do they reflect? Is there still fairly widespread mistrust, like that of my neighbor, in the possibilities of collective work? Or is the truth about the experience of the Kaluga workers being twisted and distorted? The decrees concerning the brigade form have given a clear-cut answer to these questions.

#### The Confession of a Foreman

The bell rang, announcing the end of class. But the group did not hasten to disperse. The classes were in an institute for increasing qualifications where I had been instructed to give several lectures on the fundamentals of

the psychology and pedagogy of management to a group of foremen. I was satisfied with the way the group listened and with the questions they asked me. While I was filling out the attendance sheet, foremen were leaving the auditorium in small groups, continuing while they were walking to discuss what they had heard in the lecture. Only one of the students, a young chap with the insignia of an institute on his jacket, stood apart looking undecidedly toward me and slowly placed the prospectus and books in his briefcase.

When the auditorium was quite empty he came up to me: "You said that you had previously worked as a foreman too, and you praised the new brigades. But in my opinion, in his heart the foreman will always be against such brigades."

"Why?" I was surprised.

"Well, listen to my conclusions," he said. If a section has a strong brigade leader and a good brigade council, why does it need a foreman? The work is distributed by the brigade leader. He is also the one who explains how to do it. Previously, earnings somehow depended on the foreman. By the end of the month even the most volatile and loud-mouthed became meek and obliging. And they worked overtime and on Saturdays if necessary without complaint. They understood that I could give them more advantageous work or close more orders. But now there is just one order for the entire brigade staff. The month has hardly begun and they all know ahead of time what they will earn. The brigade council distributes the bonuses and increments. If they want to they listen to the foreman, and if they do not agree with him they do whatever they wish. But nobody will abolish this position. Out of inertia they still continue to repeat: the foreman is the main figure in production. But in my opinion, after the brigade leaders come along there is nothing left of this figure.

Recently a lathe operator failed to show up for work in my section. I looked at the time board and raised a fuss. But the brigade leader had given him permission to be absent that day because he had done some emergency work on the preceding Saturday. The shop chief scolded my brigade leader and said that such decisions should be made along with the foreman. But is this really the problem? The main this is that he came with his request to be absent not to me, but to the brigade leader. From now on they will observe the formalities. But still the workers understand that the brigade leader has the final word. So they are drawn to him.

"Before leaving I conducted an experiment. I did not leave my glassed-in booth to make rounds before the beginning of the shift, but sat in my place in the foreman's office almost until lunch. Anyone can easily see from any corner of our work bay that I am in the shop and at my desk. And do you think that a single one of the workers came in to see me? But nothing happened; the section operated normally. Previously foremen were sent neither on business trips nor to the kolkhoz. Now they have already begun to do this. I myself asked to come here for training. I became bored with sticking my nose in things in the section. And the brigade leader does the real work now ..."

### The Brigade Leader's Story

"Mikhail has been working as a brigade leader for a long time. I knew him well way back when he was working in a body-assembly shop at one of the shipyards of Nikolayev. At that time I was put in charge of the assembly section and he was appointed leader of the brigade of electric welders. In that collective there were workers with more time and a higher rating. Therefore Mikhail did not manage immediately or easily to gain authority among the people with whom he was working. One time I witnessed the following scene. It was necessary to weld a piece of a joint on a deck completely and quickly. I went to Mikhail and explained to him why the hurry. He nodded understandingly and called a welder from his brigade, showed him where he was to go and added: 'Make sure that it is completely rounded off before the whistle blows.'

"The worker looked at the joint and returned to his work place.

"After a couple of minutes Mikhail went up to him again: 'Why are you not going up to the deck?' 'Since you scheduled the work to be done before the whistle blew, I would like to see how you would manage to get it done,' the worker's lips trembled ironically and he hid his face behind a panel. Mikhail did not answer, but after lunch he actually did pull his cable up to the joint, and I saw him on the grid under the deck taking refuge in the light of his welding arc.

"By the end of the shift several people from Mikhail's brigade, having coiled up their cables, looked curiously under the deck. I understood that the workers already knew about the incident that had taken place and they were interested in seeing how the brigade leader would act now that he had put himself in an awkward situation. Finally he too began to roll up his cable.

"So we will not be working overtime?" asked one of the workers. Mikhail remained silent. 'You yourself said that we absolutely must finish it,' the one who had refused to do the welding reminded him.

"So I had to finish it," Mikhail began to pack up the cable that was rolled neatly around him.

"With Mikhail's arrival the brigade gradually began to change from one which was unremarkable and disorderly. It began to be mentioned more and more frequently among the leading ones and it began to earn class positions in the competition. From month to month the norms for the amount of processing work began to increase. Attitudes in the brigade began to change as well. I paid attention to the fact that boys who had just returned from the army who were only a couple of years younger than their brigade leader began to go to him, and they called him 'Uncle Misha.' And a couple of years later when he was no longer working at the plant, they were proud of Mikhail when they saw his name in the oblast newspaper in the list of people who had been celebrated with government awards.

"When they began to create comprehensive brigades that are paid according to the final results of the labor, Mikhail was one for the first to head a

collective, which included electric welders, ship assembly workers and ship inspectors. Having learned about this, the first time I met him in the city I began to ask him about his new brigade. I ran into him after work, and since we lived in the same area, we decided to walk home together.

"They are right when they say that the comprehensive brigade is a promising thing," Mikhail began the conversation. 'I have felt it myself: it is more interesting to work in it, there is less idle time, and labor productivity is higher. But,' he fell silent and finished somewhat limply, 'I feel like we are parting like ships at sea.'

"Why?" I smiled.

"Mikhail did not answer for a long time, and we walked silently side by side. Then without hurrying, in time with our steps he began to pronounce short phrases.

"There are various reasons. It is not easy to explain some of them. Comprehensive brigades are the tomorrow of our industry. But the majority of labor laws were created yesterday. Therefore they hamper these brigades today. Recently I ordered all my assembly workers and welders to carry out a common assignment in one small area of the ship. The welders left it and went home at 4 o'clock as they are supposed to, but the assembly workers had to remain until 5. They are not allowed to leave early. Within 2 days there was talk in the brigade that the assembly workers were working more than the welders ...'

"Now let us take our welders. Even when they were accepted into the vocational and technical school they were told that the welder is the "god of fire," the "magician of the arc" and other eloquent phrases about this occupation. I understand that all this is necessary and it helps to educate them. But under the new conditions professional pride sometimes turns into professional arrogance. The "god of fire" turns up his nose when in a comprehensive brigade he has to take up the sledge hammer of an assembly worker. And the common interest in the results of the work does not always win out in a conflict with personal interests. I already have one such "god" and welding ace who requested to be moved to a different shop. They do not have brigades like ours there yet.'

"Respect for the occupation should probably be instilled in young workers in a different way. Now assembly workers and welders even train in different groups at the PTU. But for comprehensive brigades it is necessary to train them in a different way. Even in the schools for foremen they should become accustomed to doing everything that is required in the brigade. Then such a brigade will be joined together by more than just common earnings. And here in the decree of the USSR Council of Ministers and the AUCCTU (December 1983) it is written: "Students in vocational and technical training institutions are assigned to specific brigades from the beginning of their on-the-job training before graduation."

"Now let us take the brigade leader. When it was suggested that I take charge of a comprehensive brigade, I thought: I have my health and experience.

Our brigade is doing pretty well. So I can lead it. What am I afraid of? But now it has turned out that not everything is that simple ...'

"We stopped and let a trolley go by.

"Today I sent the boys to their places at the beginning of the shift," continued Mikhail. "I instructed to installers to install fixtures in the hold. I crawled into this same hold myself to weld the slats on the upper deck. I lit the first electrode and looked down. My installers had gathered around the table, had laid some blueprints out on it, and were discussing something. I lit a couple more electrodes and looked and they were still crowded around the blueprints. Before lunch I walked through the brigade. I inspected what had been done. But this couple had installed only a few welded pieces. I sensed that something had the boys deeply engrossed. That assignment could have been done more quickly. I stopped near their table. They looked at me and I at them. I thought to myself: should I say something to them about the fact that they had sat around half the shift or should I pretend that I had not noticed?

"You understand that I am not a foreman. A foreman is an engineer with a diploma and has the right to demand that the workers fulfill the norm. And if a worker is not succeeding, the foreman can reproach him because of his high rank. But the brigade leader is the same kind of worker as all the rest. My rights and diploma -- there! -- Mikhail placed his hands together his palms up, as though they were a book -- this is all the authority of the brigade leader. And if you are unable to show the boys in the brigade how a particular job is to be done, you cannot teach them with your tongue. So I went past the two installers without saying anything.

"Then I was going home and feeling depressed. I was acting as though I did not see myself. In these circumstances a little thought seeped through: would it not be better to turn in my resignation, and gather the welders together into a separate brigade the way it was before? At least I would feel like myself ...'

"After we had said goodbye and parted I thought for a long time about what I had heard. I thought again about how superficial and one-sided our information about the reality brigade labor is, about how inadequately we have studied the experience that has been accumulated. And out of inertia we frequently think that experience is mainly our achievements and successes. And very rarely and unwillingly we learn from our mistakes and omissions. And yet economists, sociologists and psychologists could probably gain a good deal that is interesting and useful from a comprehensive study of the reasons why certain brigades sometimes break up when they have not been correctly formed.

"And if someone has been elected a brigade leader, let him be given the rights, and let the foreman not 'approve,' but let him delegate to the brigade leader some of his authority, help to exercise it and strengthen the respect for the manager of the new administrative unit."

## Instead of a Conclusion

In recent years I have had occasion in many cities to visit plants which were dissimilar in terms of the nature of their output and the scale of production, and I have had a chance to see the various paths that are sometimes taken to introduce collective forms of organization and payment for labor. Upon reflection, one begins to understand that it could hardly be any other way. In modern production problems of brigade labor, obviously, simply cannot be solved successfully according to ready-made formulas. But it is very important that the search for the new not be passed off as a distortion of advanced experience and the very essence of collective labor.

For fairly frequently, under the cover of all kinds of production "specifics," products and other factors, people look for ways of "facilitated" introduction of brigade organization of labor. In certain cases brigades are created but the system of payment and distribution of earnings is not changed. In other cases they change over to a unified plan and apply the coefficient of labor participation, but they do not change the system of planning and accountability. In still other cases they introduce both of the above, but they consider it superfluous to create brigade councils and brigade leaders.

Such variants are innumerable, and this is reflected in the decrees of the party and the government. Yet experience shows: the peculiarity of brigade labor consists in that its effectiveness declines sharply when it is introduced partially. It is true that when starting up any aggregate or equipment it is possible to organize it so that the planned capacity is reached gradually. But with brigades this tactic frequently leads to failure. If the changeover to collective labor does not justify the hopes of the workers immediately and does not produce appreciable results during the first month of work according to the new system, it is not easy to restore confidence in the brigade later.

There can be nothing trivial in the painstaking work of instilling in the people a confidence in the advantages of collective labor. Workers in the shops can always sense well whether some measures is being taken under pressure "from above" or out of conviction. For example, how are the brigade leaders being trained now? At some plants they stay for an hour or two after work. At others they have managed to organize the studies during the lunch break. There are enterprises where this training is not conducted at all prior to the creation of the brigades. In Kaluga at Turbinka the training with brigade leaders and their reserve has been conducted only with complete separation from production. For 10 days the most skilled and experienced workers leave the shop and sit down at their school desks. Of course, at this plant there is no surplus of labor force, and sometimes the schedule and the deadlines for delivering various orders are threatened. But here they were able to save the brigades from formalism, and they did not look for simplified ways. And the people have come to believe: this means that brigades are a serious matter. This means that this really is necessary.

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## DISTRIBUTION OF STUDENTS IN EDUCATIONAL INSTITUTIONS DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 186-192

[Article by Ye. N. Zhil'tsov, doctor of economic sciences, Moscow State University imeni M. V. Lomonosov: "Where to Go for Training?"]

[Text] For balanced development of the system of education it is exceptionally important to distribute eighth-grade graduates proportionally among the various types of secondary training institutions. Because education in the general educational school begins at 6 years of age and the period of education has been set at 11 year, the 9-year school is becoming the base for acquiring a general secondary and vocational education through various channels. With the completion of the ninth grade, at 15 years of age school children have an incomplete secondary education and general labor training which, in combination with occupational orientation, create for them conditions which facilitate the selection of their future occupations. The future ratios in the reproduction of the total labor force are formed in this stage: proportions in the distribution of graduates of the complete secondary general educational school among the educational units, in the training of specialists with a higher and secondary specialized education, and also this category of laborers and other workers.

During the 1980's the problem of placing students in the ninth and tenth grades, vocational and technical schools, and tekhnikums was aggravated. What caused this? Right up until 1976 there was a steady increase in the number of eighth-grade graduates from day general educational schools. Starting in 1977 this number began to drop (see figure 1) -- and there was a sharp drop in the proportion of school graduates who began to work in branches of the national economy immediately after completing the eighth grade (from 12 percent in 1970 to 1 percent in 1980).

The problem is also complicated by the departmental separation of training institutions among the USSR Minpros [Ministry of Education], Gosprofobr [State Committee on Professional Technical Education] and Minvuz [Ministry of Higher Educational Institutions]. Thus secondary specialized training institutions are under the jurisdiction of 220 ministries and departments, some of which have hundreds of tekhnikums while others have only a few. The Minvuz is in charge of their training and methodological plan. But the lack of a unified

centralized management places the tekhnikums in a position that is worse than that of the regular schools and vocational and technical schools when the admissions plan is being formulated. Having greater capabilities, the Minpros and Gosprofobr, as a rule, win out in the "competitive struggle" for eighth-grade graduates.

To some extent, departmental favoritism in this area should be overcome by the unified annual and five-year plans for filling vocational and technical schools, secondary specialized training institutions and ninth grades with eighth-grade graduates, taking into account the demand for personnel and need for a general secondary education. They began to be compiled in 1977. But one can increasingly observe differences in the indicators and forms of the plan for placing students, not only between union republics, but also within each of them -- among krays, oblasts and cities. There are also unjustifiable differences in the proportions of the distribution of eighth-grade graduates among secondary vocational and technical schools and ninth grades.

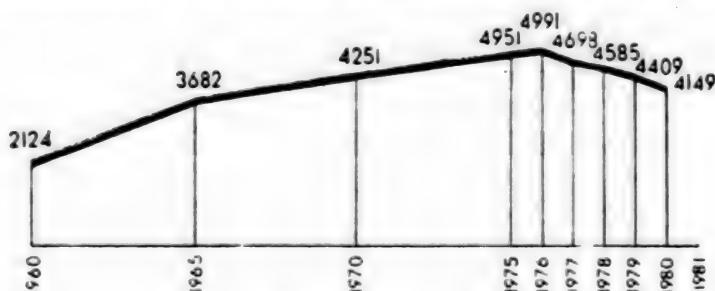


Figure 1. Graduation of Students from Eighth Grades of Day General Educational Schools, Thousands

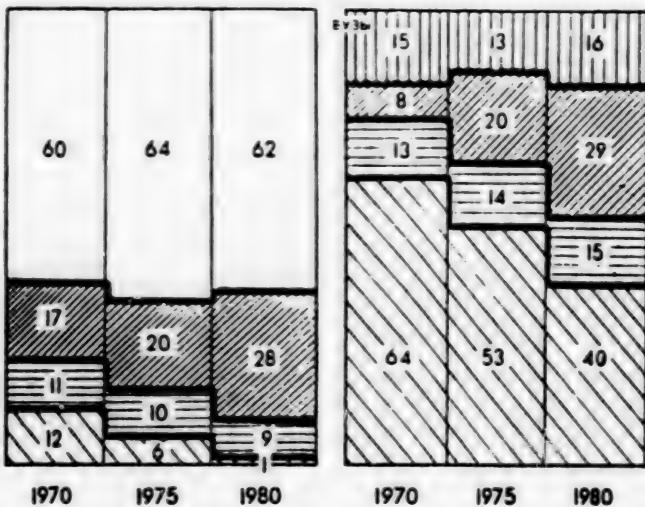
In order to improve the way these plans are drawn up, in our opinion, the following would be expedient:

to establish a policy for approval by the USSR Council of Ministers of the unified five-year plans developed by the USSR Gosplan (taking into account the opinions of the republic planning agencies) to fill the various kinds of training institutions with the distribution of the five-year assignments among the union republics and agencies of the corresponding levels of education;

to develop a single list of occupations and specialties with an indication of the type of training institutions and the deadlines for training, and to introduce a unified policy for mastering the qualifications of the labor professions that have been acquired in various forms of training;

for effective organization of labor training and occupational orientation, through the forces to statistical agencies to regularly clarify the wishes of the students and their parents with respect to the selection of an occupation and the type of training institution;

to strengthen the organizational unity of the Minpros and Gosprofobr, and to transfer the subdivision for vocational and technical education of the labor resource division to the division for culture and education of the USSR Gosplan and the corresponding divisions of the union republics.



**Figure 2. Distribution of Graduates of Eighth and Tenth Grades For Training at Various Levels of Education and for Work in the National Economy, Percent of Total**

One of the areas for effective coordination of the activity of the general educational and vocational schools could be the creation of central and local interdepartmental commissions, from the USSR Council of Ministers to the ispolkoms of city and rayon soviets of people's deputies, as envisioned by the draft of the CPSU Central Committee, "Basic Directions Reforming the General Educational and Vocational School."

For long-range planning of the distribution of youth among the educational areas up to the year 2000, it is exceptionally important to develop the concept of differentiation of the secondary level of education. For example, in the next 10-15 years, because of the reduction of the natural growth of the number of able-bodied population, it will be necessary to sharply increase the number of admissions of eighth-grade graduates into secondary vocational and technical schools, and correspondingly reduce the number of admissions into ninth grades and tekhnikums. One can use as an example the Leningrad model of distribution, in which one-half of the graduates of the eighth-grade continue their studies in schools and the other half continues in secondary vocational and technical schools. The advantage of this approach is that the students in the vocational and technical schools are immediately oriented toward a specific labor occupation and direct participation in socially useful labor in the national economy. The one-sided orientation toward VUZes, which is found in youth, parents and the schools, is overcome to some extent. With improvement of material well-being, many families no longer need to have their children earn money at an early age and they try to give them a general education in secondary schools.

In order not to lower the general educational level of youth, before making secondary vocational and technical schools the leading unit of secondary educational institutions, it is necessary to do a large amount of preparatory work to improve theoretical and practical training in vocational and technical schools. One should not forget that in order for this approach to become widespread, significant financial expenditures will be necessary.

Calculations show that to train one worker in secondary vocational and technical schools costs 2,300 - 2,500 rubles per year, and in in technical schools, including training in senior classes of the secondary school, -- 1,700 - 1,800 rubles. The expenditures are approximately the same for training workers in tekhnikums.

The draft of the CPSU Central Committee, "Basic Directions for Reforming the General Educational and Vocational School," envisions that the currently existing various types of vocational and technical educational institutions be reorganized into a unified type of educational institution -- secondary vocational and technical schools. This will improve the quality of the education and increase the social prestige of this kind of educational institution.

In order to acquire higher qualifications or enter a more difficult occupation, graduates of the secondary general educational school can enter the divisions of secondary vocational and technical schools. In our opinion, when drawing up the training programs it is necessary to take into account the knowledge and skills acquired during the process of labor training in the secondary general educational school.

Some scholars and public education workers suggest retaining the leading role of the general educational school (keep the proportion of eighth-grade graduates who are sent to ninth grades at the level of 60 percent). And it is recommended that a moderate increase in the number of admissions to secondary vocational and technical schools be provided mainly as a result of a gradual reduction of the admission of eighth-grade graduates into tekhnikums. In training workers for the near future we are relying mainly on divisions of secondary vocational and technical schools with an accelerated training period which will be filled with graduates of the complete general educational school. As a result, the youth will receive a full general polytechnical education, and the form of combining with productive labor will be more flexible. Because of the differentiated time periods for training in divisions of secondary vocational and technical schools on the basis of the full secondary school there will be a better opportunity to train workers in more complicated and mass occupations. With this approach the training of the workers will cost the state less. The students will have more freedom in their selection of an occupation and the type of training institution.

But then it becomes much more difficult to solve the problem of permanent personnel since among youth with a secondary education the orientation away from mass labor occupations with primarily physical labor is much stronger than among graduates with an incomplete secondary education. In order to take this approach successfully, it is necessary first of all to establish in the public consciousness an understanding of the social equality of all kinds of labor. But without comprehensive mechanization and automation of production, which makes it possible to eliminate heavy physical and all kinds of unskilled labor, and without a radical improvement of labor education and occupational orientation, this problem cannot be solved.

In our opinion, in the near future both approaches to differentiation of the secondary level of education will be taken. Thus in regions which have a critical shortage of workers and extensive possibilities of having the enterprises participation in the construction of vocational and technical schools, it would be expedient to give preference to secondary vocational and technical schools. And in regions which have a favorable balance of labor resources and limited possibilities of bringing in non-budget funds for the development of vocational and technical schools, perhaps, it would be more effective to give priority to the secondary general educational school, but with strongly developed labor training.

This also corresponds to provision VIII of the section of the draft of the reform in which it is noted that the ratios among the flows for further training of ninth-grade graduates takes form in keeping with the needs of the national economy, taking into account the wishes, inclinations and capabilities of the students.

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## EDUCATION AFFECTS ADAPTATION OF GRADUATES IN PRODUCTION

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 192-198

[Article by F. S. Makhov, candidate of psychological sciences, Higher School of the Trade Union Movement (Leningrad): "Adaptation of PTU and School Graduates in Production"]

[Text] Not only the output of products, but also the subsequent destiny of young workers in life depend on how the occupational training of the new generation of workers fits into production, how the boys and girls feel in their new collectives, and what their evaluations and self-evaluations are like. Will they be satisfied with life when they have gained mastery and become entrenched in industry, or even in the first months of their labor biography will they become disenchanted with their work? Youth make up 70-74 percent of the workers who are released from their jobs.

Who adapts more quickly in industry, the graduate of the PTU [vocational and technical school] or the regular school? At first glance it would seem that it would be the graduates of vocational and technical schools. Because for 3 years, under the leadership of experienced teachers and foremen, they study their specialty, acquire a secondary education, take on-the-job training at the base enterprise and, after completing school, as a rule, they go there to work.

But what about yesterday's tenth grader? He has tried to enter the institute and was "weeded out." He has come to the plant to acquire a specialty, and he already has a certain burden of disenchantment as well as considerably less production experience (as compared to PTU students) acquired in the training and production complex. Of course it is more difficult for him to adapt to industry. This opinion is fairly widespread. But it is not confirmed by the results of research conducted by psychologists.<sup>1</sup>

It turned out that during the first half year of work up to half of the PTU graduates think that they have not adapted well to their new work position. To the question: "Does your work suit you now?" an affirmative answer was given by 61 percent of yesterday's regular school graduates and only 53 percent of those who had completed PTU's. Moreover, in terms of such important qualities as organization, conscientiousness, discipline and self-

evaluation, PTU students rated lower than their contemporaries from the secondary schools. And self-evaluation of professional mastery was higher among the former. This is explained partially by their high production rank. The researchers explained that every second or third PTU student would like to change his place of work immediately and go to a different collective without changing his occupation. An alarming symptom. It turns out that it is indeed difficult for many PTU graduates to adapt to the labor collective. What is the reason for this? Unfortunately, the people who conducted the research leave this question unanswered.

Let us try to explain the situation. These two categories of young workers differ not so much on the occupational as on the socio-psychological plane. For the adaptation of a young worker in industry is determined both by acquired special knowledge and labor skills and by the new interpersonal relations: the ability to make contact with people, to listen to the opinions of others, to react flexibly to the changing industrial and psychological situation, and to deal with the traditions of the labor collective. All this, in turn, depends on the personal qualities of the worker -- education, discipline, organization, sociability, kindness and so forth. But it is precisely here that many PTU students are still behind those who go to regular schools. They lag behind in terms of their level of culture and erudition as well. In Belorussia in SPTU No 15 as an experiment in one group of carpenters they reduced the number of practical lessons in the specialty and at the same time increased the attention paid to the aesthetic development of the students. The graduation examinations showed that they had mastered their specialty better as well.

In our opinion, in the vocational and technical schools it is necessary to essentially improve the psychological preparation and also the quality of individual educational work. But it is not easy to do this. Since up to now the PTU's have been receiving many adolescents from broken and poor families (according to selective data, there are twice as many of them there as there are in the regular schools), a considerable proportion of the students in the first courses have weak knowledge in the area of the eighth-grade program. Thus in four out of the five PTU's we investigated in Tallinn, the grade point average for the eighth grade for the newcomers was 3.1-3.2 and in only one of them was it 3.5. And then it was not so much a matter of the mediocre grades as the convictions that had been formed by some of the eighth grade graduates: "No matter how much you study, after the eighth grade they will drag you out and send you to a PTU." Then a student like this comes to the PTU with a poor knowledge of the program in a school for incomplete secondary education. It is good if the teachers and educators are able to instill in him a real interest and drag him out of the quagmire of failure and a lack of confidence in his own abilities. But what if they do not have enough energy or ability? Then again, as in the school, they will pull the student through until graduation. The most dangerous thing is that then the future workers are imbued with the confidence that for poor work (for students studies are the basic form of labor) it is possible to receive satisfactory evaluations.

But in industry, especially with brigade organization of labor, the criteria for industrial and psychological relations are different from those in effect in the school or the PTU. In the brigade, if you cannot do something, but

want to learn, they will help you. But if you cannot do something and do not want to learn, you should not expect good relations. They will not put up with slipshod work or do the work of idlers for very long. This is why the students who have been pulled through the school or PTU find it more difficult to adapt after graduation: in the shop they count on indulgence and condescension. Taking into account the inadequate increase in job requirements (third category!) and the weak overall social activity which are typical of students like these, their industrial and social adaptation, especially during the first half year, takes place under more difficult psychological conditions than those of their contemporaries who have skills in independent work, high confidence in their forces and knowledge, and a more objective self-evaluation.

Unfortunately, in many PTU's (especially those which train builders and metal workers) the general educational training is weak. A considerable proportion of the students do not do their homework in general educational disciplines at all. Too much free time has a negative effect on the formation of the personality, especially when the leisure of the adolescents is not organized.

All that has been said confirms once again that a full-fledged secondary education is necessary both for successful mastery of occupations and for a harmoniously developed personality. The PTU graduate should have not merely a formal "certificate of a secondary education," but a certificate of certain moral and volitional qualities and an interest in life. There is not doubt that this has an influence on the industrial and psychological adaptation of young workers at the enterprise. It depends also on how capable they are of analyzing and critically interpreting their actions.

And although many graduates of regular schools do not consider a labor occupation their final one, they take a more responsible attitude toward their work and the collective. This is apparently explained by their more rapid and radical (as compared to PTU students) transition to "the adult condition of a worker" and their need to maintain control of themselves and not become weak, since their plans for their subsequent life require greater purposiveness and self-discipline. There greater communication skills play no small role here. As a rule, in communication with adults they are more relaxed than graduates of vocational and technical schools are.

But, in our opinion, it is not just psychological and pedagogical factors that explain the difficulties in the initial industrial adaptation of PTU graduates. To a certain degree they are conditioned by the character and conditions for industrial training in the schools, which, with all their many merits as compared to the brigade-trainee method of training young workers, also have their shortcomings. "The process of updating equipment and providing the shops with new kinds of it is proceeding unsatisfactorily. The base enterprises and business must take a large share of the blame for these omissions. One must hope that under the forthcoming five-year plan they will be more concerned about the PTU's for which they are responsible. They are bound to do this by the new provisions concerning professional and technical training institutions of the USSR."<sup>2</sup>

Yesterday's school child, when he comes to the plant, immediately learns to work with modern equipment. The shop and the brigade are vitally interested in making sure that the newcomer adapts as quickly as possible to industry and to the collective. But the PTU graduate ends up in a difficult position: the equipment in the school shops was old and the training methods were frequently outdated, but during on-the-job training at the plant they devote less attention to him than they do to his contemporary from the school, who must be producing products not after a year, but after a month. So it turns out that when a PTU graduate comes to the brigade he must immediately relearn some things and learn some things from the beginning. And his self-evaluation of his occupational mastery (according to the criteria of the school), we repeat, is not high. He does not always understand that the third category is assigned to him as though in advance. When it turns out that he does not live up to the third category and he is told about this, he is offended. A situation of conflict arises which, naturally, does not contribute to adaptation.

This is manifested especially clearly in light industry, which can and should be restructured more rapidly to correspond to the modern needs of the economy. But, alas, in this branch too the system of training specialists through secondary PTU's suffers from all the same problems. For example, every fourth specialist who is trained at the Leningrad sewing PTU comes to production with the highest category in the branch. And a high skill category is a recognition of the worker's mastery. A person who holds this category should know the theory of the work completely and have solid skills for performing complicated operations. Such skills usually appear as a result of prolonged work. A PTU graduate with a high category has hardly mastered them. As a rule, at first he needs an experienced mentor, who sometimes has a formal production category which is lower than that of his student. Today, especially in light industry, such a situation is fairly widespread. Of course it does not contribute to the psychological adaptation of the young workers, and it deprives certain PTU graduates of the prospects for occupational growth (of course, if they are not paid by the piece).

With the brigade form of labor (with a single order), earnings are calculated taking into account the coefficient of labor participation of each member of the brigade. What happens if this coefficient does not correspond to the production category? Should this be ignored, paying no attention to it? One is faced with a devaluation of the training of workers in the PTU.

And another fact of no small importance deserves attention. The brigade method, as we know, requires the mastery of related occupations. Otherwise interruptions and idle time are inevitable. Workers with a broad profile are needed. They can be trained only in PTU's. Neither the secondary school with its training and production combines nor the enterprise with its limited training and methodological capabilities is in a position to cope with this task. But the training of workers with a broad profile in PTU's is effective only when the enterprise actually needs such workers, when the brigade form exists there not in words, but in deeds. And if the plant is interested only in efficiently trained "operators," at first this gives the advantage not to PTU graduates who are specialists with a broad profile, but to young workers who are narrow specialists who have been trained directly in industry.

How does one arrange it so that the vocational and technical schools are not filled mainly from the so-called "school ballast," which contains many difficult and pedagogically neglected youth? Just appeals to the secondary school to "turn in the direction of the PTU" will not solve the problem. Serious changes must be made in the public education system. These are what are being discussed in the draft of the CPSU Central Committee, "Basic Directions for Reforming the General Educational and Vocational School." It is being suggested that tenth and eleventh grades be included in the secondary general educational and vocational schools as well as secondary vocational and technical schools and secondary specialized training institutions. During the course of one or two five-year plans it is intended that the general secondary education of youth be augmented with general vocational education. As a result, not only with the quality of vocational orientation and vocational and technical education improve, but also the general educational and cultural levels of the students will gradually be equalized.

Such an equalization, with which there is not nor can there be any of the notorious "directional" orientation toward labor professions or toward the VUZ as early as the sixth - eighth grades as is now the case, will undoubtedly contribute to rapid and favorable industrial and psychological adaptation of vocational school graduates in the national economy. Of course this equalization presupposes a large amount of preparatory work, particularly a change in the programs and methods of training and education, retraining of teachers, and so forth.

#### FOOTNOTES

1. Kiril'tseva, A. A., "Psikhologicheskiye osobennosti proizvodstvennoy adaptatsii vypusknikov PTU i sredney shkoly" [The Psychological Peculiarities of Industrial Adaptation of PTU and Secondary School Graduates], VOPROSY PSIKHOLOGII, 1980, No 4, pp 118-123
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## QUALITIES OF MANAGER OF SCIENTIFIC COLLECTIVE DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 199-214

[Article by I. I. Prokopenko, candidate of economic sciences, Institute of Economics of the UkrSSR Academy of Sciences (Kiev): "Who Can Be the Manager of a Scientific Collective"]

[Text] The effectiveness of scientific and technical progress depends to an immense degree on the quality of management of the entire cycle of NIOKR [scientific research and experimental design work] -- from the idea to mass utilization of the new item or technology in production and consumption. The role of the NIOKR manager becomes especially visible if one takes into account the sharp increase in expenditures on research and development and the increase in the absolute number and growth of the proportion of scientific and technical personnel.

In this connection it is interesting to look at foreign experience in stimulating research activity through strengthening the personal factor in management and increasing the professional competence of managers of NIOKR.

### A Creative Organization and the Functions of its Manager

The major resource for a creative organization are the creative specialists (and not simply scientists or engineers), that is, an environment which is open to the perception of new ideas, and also well developed technical equipment for collective and individual disclosure and solutions to creative problems.

But it is not enough to have merely an organization of talented people. The organizational climate must be favorable for the perception of creative ideas. Otherwise the specialists either stop making innovative suggestions ("there is no point in it, nobody needs it anyway") or they go to another organization which has a more favorable atmosphere.

Neither capital investments in scientific equipment nor increased monetary remunerations are of any help here. There are many known examples in which well equipped state laboratories in the United States have been forced to close their doors because of ineffective work. The main reason for this is

the rigid, bureaucratic, department-oriented system of organization and management of these laboratories, whereby, for example, finances from the state budget were not for specific scientific problems, but for the staffs of the laboratories. The administrative activity was oriented toward the process and not toward the final goal. This led to an excessive attraction to methods of directive management, a desire to satisfy the demands of a considerable number of contradictory and secondary indicators, and to narrow specialization and the selection of research problems for the specialists. The result was a higher stage of organization, losses of horizontal ties within the laboratories, a departure from the demands of production and a marked deterioration of the creative climate. An analysis of the management activity of a number of extremely successful NIOKR organizations has made it possible to single out the following most important and common functions of managers of research collectives in the United States:

The formulation of the strategy and purposes of the NIOKR in keeping with the goals and strategies of the entire company or branch. Informing the research collective of this strategy.

The search for, selection and retention of the most talented specialists, the increase of their skills, the development of creative potential and its maximum utilization; the maintenance of the correspondence of the skill structure of the specialists and the goals and tasks of the research organization.

The creation of a favorable microclimate which is open to new ideas and stimulates maximum disclosure and utilization of the creative potential of each specialist. Creative ideas are accepted without prejudice and are not rejected out of hand, even if they do not correspond to the current plans or existing practice. The manager of research has an excellent awareness of the organization's creative reserves and the researchers themselves know this.

The development of a formalized system of selection of research programs and plans in keeping with the financial resources and goals of the organization; the development of detailed criteria for measuring the process of movement of the NIOKR and its final results, and control over efficient utilization of resources.

On-the-spot management of the research organization and interaction between research functions and line management throughout the company, and provision of flows of information between them.

The utilization of known and the development of new methods of stimulating the creative activity of each specialist, and the struggle against resistance to changes both in the collective and in the firm as a whole.

Let us discuss in more detail the interesting aspects of management of a creative collective in the United States. There is no doubt that a decisive role in scientific and technical creativity is played by the personality factor -- the creative activity, skills, interests, and also the micro-environment in which the specialist is working. Therefore there is no more important function for the manager of an NIOKR organization than the selection

of talented specialists and the creation of a favorable creative climate. For the manager of NIOKR this function is more significant than it is in other spheres of the economy, since formalization is difficult in research because of the high degree of indefiniteness. Consequently, the research organization needs specialists with increased creative activity, who are able to see systemic ties and interconnections when there is a shortage of information.

A good manager should trust his researchers since he himself does not have all the means of control over the creative process as a result of his possible incompetence in all or some elements of the research. It is extremely important for the manager of a research organization to be so confident in himself that he can select specialists who are more competent than he is.

Experience shows that behind each successful innovation stands, as a rule, one or several of the more creative people who are responsible for transforming ideas into a product and have special qualities which are not mandatory in other positions. The manager should be familiar with the peculiarities of the behavior of people with increased creative activity (for example, little interest in details, volatility, an ability to communicate that is not always expressed, a clearly expressed interest in communicating with colleagues, increased curiosity, and so forth). It is important for the manager of a research organization to know the criteria by which one recognizes the degree of creative activity. For example, as a result of experiments, 16 personality characteristics inherent in a creative personality were revealed. They include a desire to dominate, enthusiasm, intelligence, egocentricity, emotionality, separation of emotional and intellectual life, cyclotomia (an inclination toward mood swings from rapture to depression) and so forth. The experiments showed the high degree of correlation between the aforementioned characteristics and the degree of creative activity.

The technique of cognition of direct and indirect indications and characteristics of people with increased creative activity has been included in the program for training both NIOKR managers and personnel managers.

An important function of the manager of a research organization is to stimulate creative talent. In spite of the collectivity of scientific creativity, new ideas are generated, as a rule, by a specific individual and not by a collective, although this can also take place during the process of collective work. Therefore in research collectives it is especially important to notice and encourage individual results above all. Creative specialists are more interested in recognition and moral stimuli than they are in monetary remuneration.

Creative ideas are generated more easily under the conditions of an open and benevolent attitude which encourages creativity as such. For 175 eminent American scientists, among the 10 most important factors contributing to creative activity in the collective (85 percent of the total points) were those such as freedom to work in the area that interested the scientist, recognition and evaluation by the collective of his personal achievements, communication with colleagues, and encouragement of risk. Incidentally, monetary remuneration as a factor in stimulating creativity received only 4.5 percent of the points in the United States.

Managers of research collectives have to deal with opponents of innovation. Sometimes the managers of research and the specialists forget that introducing new technology, new structures and new interconnections requires not only updating of qualifications, but frequently also a change in the very system of thinking. When a new organizational or technical component is introduced into a system it is usually necessary to have some percentage of new people. This is frequently ignored. As a result, a large part of the organization is opposed to the changes and places barriers against them.

The manager of research must be ready for opposition to changes in the organization. The more radical the suggestions, the stronger the resistance will be.

A new idea should always be regarded as a good one, even if it is never realized. The creative process requires a positive approach to ideas. Numerous observations and experiments have shown that if the manager refrains from any evaluations of ideas during the process of their origination, there is a maximum number of them and he then has the opportunity to select when making a final decision. Even in a clearly doubtful idea the manager should try to find possible positive elements and thus encourage the continuation of the creative process. Creativity is facilitated if the creator of the idea is not always having to take a defensive position against premature criticism.

Interesting in this connection is the experience of the General Motors Company, where rewards are given for absolutely all efficiency proposals from workers and employees, regardless of their value and feasibility. It has been calculated that if even 2 percent of these proposals are realized, the expenditures on remuneration for all the others will be more than recouped. The advantage lies in the fact that more people are drawn into the creative process and thus there is a greater possibility of the appearance of a valuable idea.

In the United States they place a high value on the manager's tolerance of opinions and changes proposed by researchers. A manager who cannot tolerate mistakes kills initiative -- the most essential elements of creativity. In this regard it is appropriate to mention the catchy expression of the president of the English company United Bauxite who said that "a person who never makes a mistake is only helping the person who does."

Another extreme which impedes the creative process is the manager's acceptance of the first idea which seems successful to him. After this the creative process comes to a halt, and one never knows how many more valuable ideas have been missed. In research collectives mistakes can also be used to stimulate creative activity. There is also the concept of "management of mistakes," in which the manager of a research collective takes advantage of mistakes not for destructive criticism, which undermines initiative, but for the creation of a situation which motivates the collective not to conceal mistakes, but to reveal them and take risks. If minor blunders are revealed promptly, people learn from them and they do not become mistakes which cannot be rectified in later stages of the program.

One of the factors in the management of a research collective is deliberate encouragement of various opinions and contradictions. This leads to a diversity of ideas and approaches, and it eliminates monopolization of them, which is fatal to the creative process.

A professionally trained NIOKR manager should master numerous well developed devices for stimulating creative activity. Three main approaches to the management of a research organization are interesting. The first is the orientation toward the development of ideas and concepts; the second is toward the production of the scientific product (items or knowledge), and the third is toward the market, toward the study and satisfaction of specific demands. It is the third approach that is considered the most popular, since research of the market in the broad sense of the word makes it possible to determine more precisely the kind of product, its specifications, its cost and its technical parameters. Only on the basis of this can one install the necessary technical equipment and technology, and the latter stimulate new ideas and concepts.

Of the 500 managers of large scientific research and planning organizations in the United States who were questioned in 1982, 70 percent thought that the most important contribution of research subdivisions to the activity of companies is the development of new products. The task that was second in importance was the reduction of production outlays.

The ratio between research on order from the market and research dictated by the logic of technical development is approximately 7:3 in companies of capitalist countries. This has led to an essential change in the role and functions of the NIOKR manager. The majority of new plans can now be proposed and developed only with the participation of the company's marketing director. Market research has placed serious demands on the NIOKR managers, and his purview must go far beyond the framework of the process of the creation of innovations.

The increased value of innovations and their complexity and qualitative parameters have led to the development of so-called "package" research, the essence of which consists in revealing already available "know-how" and combining it in the form of modules into a new product. "An immense quantity of technologies," says an eminent specialist in the area of management, P. Draker, "is not new knowledge. It is a new relationship, a new distribution of things which have long been surrounding us in a way that nobody has ever thought of before." This type of research produces rapid results with low expenditures. The nature of "package" research is essentially different, for example, from fundamental research. The process of conducting such research is also distinguished by the fact that it can be planned and controlled more easily. Consequently, it requires a different quality of management.

One of the important factors in the success of new research programs is the research manager's ability to effectively perform the "protective" function for his associates. He must be the "buffer," the "shock absorber," and protect the collective from external influences and changes so as to give it the opportunity to bring the research to completion. "External influences" are the demands for the preparation of numerous documents, questionnaires and

reports, conferences for which there is not critical need, and also the desire to place on the shoulders of the researchers certain production functions and other functions which are not a part of their job, which can be performed by less qualified workers (or ones with completely different qualifications). The process of creativity cannot be recorded in detail by the minute, hour or operation. Therefore people sometimes get the impression that scientific research personnel are the least busy in the organization. This has encouraged certain administrators to assign them functions which are not essentially related to their creative activity. But NIOKR managers are confident that any distraction of the specialists to work beyond the sphere of creativity should be regarded as illegal encroachment on the limited budget of subdivisions of scientific research institutes and an attempt to disturb the established structure of expenditures. Rigid accounting for the time and the concrete contribution of each specialist to the fulfillment of the program helps the manager of the research to defend his budget. Providing solid accounts to pay for the time of a highly qualified specialist who has been taken away for less skilled work causes them to think twice: is it all worth it, and would it not finally be better to organize the process in such a way that each worker took care of his own business!

#### Qualities of the NIOKR Manager and Management Style

Every manager has his own style of management, which either contributes to or impedes the success of the collective. In the behavior and management style of the NIOKR manager it is useful to single out characteristics that contribute to the effectiveness of the creative collective.

It is important that the personality of the manager be sufficiently flexible and that he feel confident both in production and in research. This makes it necessary for him to have a much broader range of qualities than is required for a worker who belongs to one of these spheres. For example, line managers in production, when they are in charge of research subdivisions, find it difficult to understand the interests and behavior of researchers, and try to bring more organization to the creative process than is necessary or reasonable. Because of the varied nature of management of production and the innovation process, conflicts between managers of production and NIOKR are not the exception, but the rule. It is also the rule that in the creative collectives themselves, conflicts arise because of differences of opinion or different ways of solving the same problem. The valuable quality of the manager of the research collective is certainly not the ability to suppress the conflicts and impose conformity, but the ability to manage the conflicts in such a way as not to destroy the free creative situation or the tolerance of different opinions.

Because of the widespread matrix (target-program) forms of management of NIOKR at the most varied levels, frequently the only possible way of effectively integrating the resources for solving comprehensive interdisciplinary problems is the "overflow" of management authority to the lower levels of the structure and the strengthening of horizontal ties. In creative organizations practically every specialist combines in various proportions the labor of both the manager and the researcher. The qualities that become decisive are those such as cooperation and mutual assistance without coordination with a higher

level, solving problems and not increasing the external attributes of authority. Under the conditions of matrix organization, the work develops not only professional, but also important personal qualities of the individual, it makes him psychologically more mature and orients him not toward the process, but toward the final results.

But a simple structural change was never enough for creating matrix organizations. This requires new goals, new thinking and a new management technique. The people must have a scientifically substantiated approach, and they must have careful professional and psychological preparation. The manager of such an organization himself should have experience in research work and creative capabilities, although it is certainly not mandatory for these to be the highest in the collective. Without personal experience in research work, even well trained managers are inclined to formalize creativity and exercise excessive control over the process itself; they devote less attention to its final results. Such a manager is afraid of changes. He is bound to a system of management and control which has been developed in detail, but is more suitable for mass production than for scientific collectives, and he feels unconfident under conditions of indefiniteness and risk which are inherent in the majority of research projects in the initial and intermediate stages.

There is one more important quality, without which it is unthinkable for a person to be an effective manager of research and development at any organizational level. This is enterprising. An enterprising manager of a research program is the central figure in technical innovation. Enterprising managers of research programs, as a rule, are guided in their activity by a fervent desire to bring an idea to the point of producing a product. In one of the investigations which studied factors in the success of NIOKR programs that were carried out in England, the respondents placed in the first two positions (out of seven) the presence of an outstanding personality -- an enterprising enthusiast -- in the position of the manager of the program, and several creative specialists who make the main contribution to the development of the program's concepts.

A good NIOKR manager also knows when it is necessary to close down the program and can recognize failure in the early stages, as a result of which fewer resources are wasted on continuing a plan which has no future. An important quality for a manager of a creative collective is his own awareness of his shortcomings, particularly gaps in professional knowledge. He must promptly delegate authority to do jobs for which his capabilities or opportunities are inadequate.

The increased role of planning requires modification of the style of management of research programs. The more problematic the nature of the research, the more valuable the style of cooperation and the less formal the style of management should be. But the spreading of this style primarily in the later stages of the research leads, as a rule, to a retardation of the NIOKR process and to increased expenditures. It is easier to plan and control these stages, individual components of them can be mechanized and automated, and they contain more routine elements. The further the plan progresses from

the research to the production stage, the more reliance is placed on organization, planning, control and other methods of directive management.

The decisions of NIOKR managers frequently pertain to problems in which they do not have enough competence. Therefore in creative organizations it is especially important to have the participation of the researchers themselves in decision making. It is this situation that predetermines the primarily democratic style of management in research collectives.

The list of necessary qualities of NIOKR managers is fairly long. Let us give only those which are usually recognized as absolutely necessary:

curiosity;

above-average intellect;

flexibility of thought and receptivity to new ideas and information (ideas are not dismissed at the outset under the pretext: "We tried that before and nothing came of it");

the ability to reveal and precisely formulate a problem which others will not notice;

an understanding of the needs (of the collective, organization, market) and the ability to discover them before others do;

the ability to see complex ties between phenomena and processes;

the capability of casting doubt on customary ideas, norms and established concepts and tolerance of the opinions of others;

the ability to work long and intensively, giving oneself fully over to the work;

the predominance of goal orientation, the desire to solve problems and not simply to study phenomena, and never to limit oneself to existing methods or methodology and to search constantly for new approaches;

the ability to organize the creative process effectively;

the ability to utilize external opportunities actively: consultative organizations, symposiums, conferences, and personal ties in the business and scientific world;

the ability to work under the conditions of a high degree of risk and indefiniteness;

an awareness that it is natural that one's own knowledge and creative abilities can be inferior to those of one's subordinates;

enthusiasm and enterprisingness;

a mastery of the formal techniques of managing creative collectives and professional training in the area of management of research.

Live and ...

In the Westinghouse Corporation (United States) they assume that the knowledge of an engineer or researcher becomes hopelessly outdated within 10 years. He will be completely unable to make use of more than half of his useful knowledge by the end of this period because it will be completely obsolete. In this connection it is interesting to hear the conclusion of a professor of engineering psychology, H. Levitt, who says that "for the first time in history the relative advantage of experience over knowledge seems to be decreasing rapidly because of the acceleration of the rates of its obsolescence." It is no wonder that the organization of constant and continuous education of specialists holds one of the leading positions among the functions of the NIOKR manager.

An important indicator of the professionalization of management in NIOKR is the fact that about 30 percent of all scientists and engineers of industrial companies are participating in one form or another of permanent training and increasing management skills. Thus, according to data of the National Scientific Fund, in the United States more than 80 percent of industrial and state organizations are maintaining one form or another of continuous training and paying for part or all of it. It is interesting to note that this is not a general increase in qualifications according to a schedule, but strictly for a purpose which is brought about by a specific need.

For example, because of the sharp increase in the utilization of microprocessors in U. S. industry (in 1982 there were 120,000 of them and in 1985 it is expected that their number will have increased to 500,000), the corporations are actively searching for forms of effective training of management personnel in this expanding electronic information network. There is a multitude of specialized training programs for managers which are intended for up to 2 years under the slogan "Technological progress and people." The form of this training is interesting: every 6 months the participants gather for a week in order to begin to study a new section of the program. Upon returning to work they continue to "attend" the classes with the help of telecommunications. Training of this type is individualized and quite practical: the possibility of entering into dialogue with the computer at the work station enables the workers to raise concrete problems, to find optimal solutions, to utilize them in their work, to correct mistakes, and thus to learn through experience.

It is considered to be anachronistic simply to promote a capable researcher to a management position without special training or to invite a professional manager from industry or an institution to be in charge of research.

In the majority of cases, researchers who are not specially selected and trained in management are poor administrators. And to appoint a manager who is unfamiliar with the nature of research is also ineffective since he will not enjoy the respect and confidence of his subordinates. It is considered optimal when the NIOKR manager has personal experience in research work,

understands the internal laws of creativity, and has also taken training under a special program for management of a research organization.

When selecting candidates for this training it is important for the intellectual level of the future manager to be at least above the average for the collective. Thus when American and West European specialists recently measured the average I.Q. of a group of young managers of the Japanese companies Toyota, Mitsubishi, Soni and Matsusita, the average figure turned out to be 130, while for a similar group of American and West European managers it was only 100. And the proportion of these managers in the entire population in Japan turned out to be twice as great as in the United States, Canada and Western Europe. The researchers are coming to the conclusion that this is apparently one of the important factors which leads to the fact that the Western countries are behind Japan in the science-intensive areas of scientific and technical progress.

Professionalization of the management of research forces scientific workers to make a difficult choice: either research activity or management. Frequently the researcher discovers that life is forcing him to perform more and more management functions even though he has not yet made a decision to abandon research work. Frequently this is accompanied by an awareness of the fact that his scientific knowledge is outdated: new young, energetic and better trained researchers who are familiar with the latest achievements of science are making their appearance.

Moreover, there is simply not time to keep up with all the modern achievements.

An investigation of 1,500 managers of large U. S. companies showed that about 40 percent of the company presidents who were questioned think that the appearance of electronic computers has not had a great effect on the increased efficiency. These were mainly people who were graduated from college in the 1930's and 1940's. But more than 50 percent of the managers of the middle and lower levels of these same companies gave a very high rating to the role of electronic computers in increasing efficiency. The majority of them were graduated from college in the 1960's and 1970's, they are quite familiar with electronics, and they are not afraid of the changes that are involved.

For managers of the former type, for example, it is typical that by exercising authority they frequently use more resources for their own research than their problem deserves and violate the structure of the NIOKR. They are hostile toward any criticism both from managers and from their colleagues and subordinates.

The American sociologist H. Levitt pointed out that the aging of knowledge and scientific experience is accompanied by a simultaneous increase in responsibility and general stress of management work. Therefore he thinks that the NIOKR manager should reach the peak of his responsibility (and this means job level) in the earlier stages of his career when his knowledge and the condition of his health are at their highest point.

The NIOKR manager should be psychologically ready to move "downward" or "sideways" as he grows older, into an area of activity with less responsibility and stress. A lack of correspondence between the maximums of capabilities (knowledge, experience, energy and age) and responsibility (job, place in the management system) always leads to a retardation of progress in the development of the research organization. This also happens when the peak of responsibility has come before the peak of capability, but it happens more frequently when the maximum responsibility has come to the manager in the stage when his knowledge and experience have become obsolete and his energy has declined.

A solution to this problem which has long been recognized in the majority of foreign countries is to transfer capable specialists to the area of consultative activity, where their scientific and organizational potential can be maximally utilized. Still the responsibility of a consultant is considerably less since the final decisions are made not by the consultant or consulting firm, but by the client. The effectiveness of this is confirmed by the fact that the rates of growth of administrative consulting services in the West are outpacing the growth rates of production volume 3-5-fold.

But this is only the general direction of the personnel policy. For example, matrix organizations of programs require a mandatory combination of research activity and management at the lower and middle levels. It is best to determine the balance of these two kinds of activity with a concrete situation.

Under the conditions of such a change in goals and methods of managing research organizations, the diversity of styles and methods of management can be manifested in the actions of one person, but they can also require a transfer of management functions to other managers during the process of moving from the idea to the item. These managers may have different qualities which are necessary for managing the more concrete and controlled stages of NIOKR. In the former case the personnel policy and the training program should be adjusted for the selection of specialists with the broadest range of styles of management, who have the necessary flexibility and adaptability to changing conditions. Although this path is more difficult, its advantage lies in the fact that one person is in charge of the program right down to the assimilation of the item. This provides better for the comprehensiveness and the succession of various stages.

When different managers are responsible for different stages of NIOKR it is easier to select and train them. But this variant disturbs the integration and comprehensiveness of the program, increases communications barriers, and requires additional efforts and funds for smoothing out differences of opinion, achieving mutual understanding and resolving various disputes. In order to overcome this barrier, they extensively organize combined training and increasing of qualifications of managers of NIOKR, production and marketing, and enlist them in joint development of company strategies.

A combination of training and the transfer of specialists between research divisions and production and market subdivisions has turned out to be highly effective. For example, young scientists and engineers begin their careers in

the research divisions, then after 2-3 years they move to other divisions, and after a certain period of time they return to the research divisions as managers of groups or sections. This significantly improves the understanding of complex problems. Because of the professionalization of management at all levels, great significance is being attached to clarifying the nature and goals of research activity, the organizational structure and communications, as well as to a clear understanding of the qualities which are expected of managers of research subdivisions.

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## QUESTIONS FOR QUIZ ON PEOPLE'S CONTROL

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 215-216

[Unattributed article: "The People's Control"]

[Text] 1. Soviets of people's deputies form public control agencies which combine state control and people's control over workers at enterprises, institutions, organizations and kolkhozes. What functions are performed by people's control?

2. People's control committees, groups and posts at enterprises and in subdivisions are elected by a general meeting or at a conference of representatives of the collectives by open voting. For what period are they elected?

3. The work of the people's control groups and posts is organized correspondingly by the chairman and managers of the groups and posts. What kinds of activity are included in their work?

4. Nonstaff people's control workers, with the agreement of the management of the enterprise, can be relieved of production or service duties and still retain their average wages and reimbursement for expenditures for business trips that are involved in the performance of their control functions. For how long a period can they be relieved?

5. By a petition of the corresponding people's control committees and groups, the people's controllers who are most distinguished in their labor and social activity can be given incentives. How?

6. People's control committees recover unauthorized monetary expenditures from managers who are guilty of causing material damage to the state, enterprises or organizations. In what cases does this take place?

7. In certain cases, when the legislation that is in effect has established complete responsibility of officials for the damage that has been caused, the money is not recovered. What are these cases? And what is done?

8. People's control groups develop various documents. What are these documents?

9. Various documents, letters and applications come from citizens to the people's control group. How much time does it take to handle them?

10. Officials who have allowed people's controllers to be persecuted because of the public activity are held responsible. What normative act of the USSR Supreme Soviet explains the policy for applying legislation concerning the responsibility of officials who have allowed the persecution of people's controllers?

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## EKO READERS CONFERENCE HELD IN OMSK

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 217-218

[Article by Yu. I. Berbin, candidate of economic sciences: "Omsk Workers Suggest"]

[Text] At the end of October of last year in Omsk there was a conference of EKO readers which was organized by the economics department of Omsk University. The magazine's deputy editor-in-chief, Doctor of Economic Sciences B. P. Orlov, discussed the problems facing the editorial staff, the search for their solution, and the effectiveness of publications in the magazine. The next to speak were economics scholars from the university, the polytechnical, technological and highway institutes, and economists of plant services. They expressed a great deal of interest in further improvement of the magazine and named many problems which they would like to see discussed on its pages.

A docent of the university's department of labor economics, Yu. M. Chernikov, emphasized the importance of articles on the utilization of working time at enterprises. Now only 65-70 percent of it is being used efficiently. Problems of analysis of working time and the creation of a reliable information base are critical. Yu. M. Chernikov suggested that the magazine publish information on what eminent economists are working on and what large scientific topics are being developed by Siberian economics VUZes.

A docent of the polytechnical institute, V. A. Zubakin, noted that each year more than 100 polytechnical students and probably many other students in other VUZes subscribe to EKO. But among the many problems raised by the magazine, so far not enough attention has been devoted to questions of VUZ training of specialists. The Omsk Polytechnical Institute is preparing to change over to cost accounting [khozraschet] relations with enterprises that are waiting for graduates of this VUZ. The country has no experience in this kind of work. V. A. Zubakin thinks that the editorial staff should be interested in this experiment.

The chief of the division for labor and wages of the Siberian plant imeni Bortsy Revolyutsii, V. I. Kondratenko, shared his ideas about the relationship between the rates of growth of labor productivity and wages in industrial

enterprises. He discussed the fact that there is a reduction in the proportion of rates in the earnings of the workers. Thus with the average third category of work performed at the Siberian plan, the earnings are more than 200 rubles per month. Problems of wages should be reflected more profoundly on the pages of EKO. V. I. Kondratenko called for articles on questions of norm setting for labor at industrial enterprises.

The head of the department of economics and organization of consumer services of the technological institute, Docent N. U. Kazachun, drew the attention of participants in the conference to the problem of creating a unified system of movement of the industrial product from the time of its production to service after it has been sold. The creation of such a system is being impeded by a multitude of departmental barriers, and it is obviously necessary to have several articles in order to figure out this problem.

The statement from the head of the planning and economics division of the Electrical Equipment Plant imeni K. Marks, S. V. Garanin, was filled with agitation. He discussed the immense number of report documents which must be compiled and filled out by enterprise economists today. Many of these documents duplicate information and a considerable amount of time is wasted in filling them out. As an example one can refer to the enterprise passport, which completely duplicates the figures of the enterprise annual report when it is filled out according to the established methods. As a result, the plant economists work not on analyzing the activity of the enterprise and not on helping it, but on reports.

In the concluding statement Prof. B. P. Orlov assured the participants that all the proposals of the Omsk workers would be attentively considered when planning the work of the editorial staff.

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## ANSWERS TO QUESTIONS ON PEOPLE'S CONTROL

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 pp 219-220

[Unattributed article: "The People's Control"]

[Text] 1. People's control agencies control the fulfillment of state plans and assignments; they wage the struggle against violations of state discipline, manifestations of local favoritism and a narrow departmental approach to business, inefficiency and extravagance, red tape and bureaucratism; they contribute to improving the work of the state apparatus.

2. People's control committees, groups and posts at enterprises and their subdivisions are elected for 2-3 years.

3. At the enterprises people's control groups and posts conduct inspections, surprise checks and reviews, discuss their results, and bring up the questions that arise for the consideration of the administration, public organizations and labor collectives, and supervise how the administration follows their suggestions.

4. Workers can be relieved of their production or service duties for a period of up to 2 years.

5. Material and moral stimuli that are in effect can be used as incentives for people's controllers. In particular, the enterprise administration has the right to grant them additional paid vacation of up to 3 days a year.

6. The money is recovered in the following cases: failure to fulfill planning assignments and commitments for the delivery of products; the output of poor-quality or incomplete products; losses because of poor performance of construction and installation, repair, planning, agricultural and other work; spoilage, loss and write-offs of raw material, products, equipment and other values; above-normative expenditures and losses of raw material, products or energy; regular delay of means of transportation during loading and unloading in excess of the established time periods; illegal payment for monetary funds for wages, stipends, compensations, and the expenditure of funds for conducting holiday celebrations; expenditure in excess of the established maximum allocations of money for maintaining administrative staff, exceeding

the established limits for expenditures on business trips and maintaining business automobiles; illegal business trips for "fixers"; violations of the rules for the protection of nature and efficient utilization of natural resources; failure to take measures for promptly disclosing missing sums and making up for losses, forfeitures, and so forth.

7. Money is not recovered if the amount of damage exceeds 3 months' salary of the official. Then the people's control committee gives the enterprise administration an instruction to make up for the damage that was caused under the policy established by law.

8. People's control groups develop plans for inspections, surprise checks and reviews, the subject matter for classes with people's controllers, and measures for ensuring that the control is publicized, and they adopt decrees concerning granting various forms of incentives to the members of the groups and posts who are most distinguished in their work and public activity.

9. The rule is this: guidance documents are executed within the time periods indicated on them, but no later than 30 days after they are received. Responses to letters should be given within a period of up to a month, and if they do not require additional study and verification, immediately, but no later than 15 days after the letters arrive.

10. The Plenum of the USSR Supreme Court in decree No 4, "On the Application by the Courts of Legislation Concerning the Responsibility of Officials for Violation of the Policy of Considering Suggestions, Applications and Complaints of Citizens and the Persecution for Criticism," of 29 August 1980 also clarified the responsibility for persecution of people's controllers.

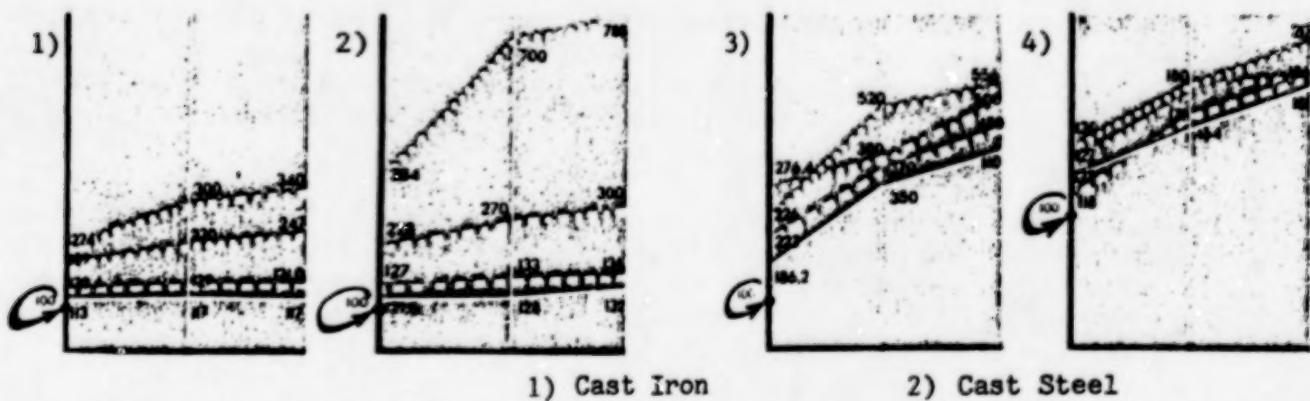
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## GROWTH RATES FOR MACHINE BUILDING PRODUCTS, 1970-1983

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 84 inside front cover

[Text] USSR: Growth Rates in Production Volumes of Products for General Machine Building Use. In Percent for 1970 [base year = 100]



1) Cast Iron

2) Cast Steel

	1975	1980	1983	1975	1980	1983
National Economy	113.0	117.0	117.0	121.6	128.0	132.0
Machine Building	120.4	129.0	131.0	127.0	133.0	136.0
Interbranch Production in Machine Building	189.0	230.0	247.0	384.0	700.0	788.0
Centralized Production	224.0	300.0	340.0	228.0	270.0	300.0

3) Hydropneumolubrication Equipment and Filtering Devices

4) Reduction Gears

	1975	1980	1983	1975	1980	1983
National Economy	186.2	350.0	410.0	123.0	164.0	181.0
Machine Building	223.4	370.0	450.0	118.0	171.0	186.0
Interbranch Production in Machine Building	226.0	520.0	556.0	130.0	180.0	217.0
Centralized Production	276.4	380.0	500.0	127.0	180.0	186.0

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